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DATTEL ELECTRONICS



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NUMBER 5



What do you
want to ask
about?

Among
High King
Holy water

Go to top

Pines of Love



NAME
TOP JETLAND
MARK

HIGH

NGIL

STAR

HLTR

WHAT IS THE
COMPUTER TERMINAL. DO YOU USE IT?
YES NO

What Is It



USING

HOLDING



PLACE

00:02:03

POWER

What Is It

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D A T A S T A T E M E N T S

Rambo Returns

Ocean has released the computer version of Stallone's *Rambo III*. Set against a topical background of arms smuggling to Afghanistan's rebels, John Rambo is searching for his captive mentor, Colonel Sam Tresham.

Starting with Rambo's search for the enemy fort where the Colonel is imprisoned, he must then don his rubber gloves to disarm numerous infra-red detector beam circuits while quietly dispatching guards with his knife. The final section involves

escaping from the fort with the Colonel and breaking for the border in an enemy tank.

Featuring the massive armory which Rambo usually carries around, the game also extensively uses 3D graphics and high-energy action. *Rambo III* costs £9.95 (tape) and £14.94 (disk) for the C64, and £24.95 for the Amiga.

Touchline: Ocean Software, 8 Central Square, Manchester M2 5NR. Tel: 061-880 1488.



Ocean's *Rambo III*

Levy Razed

The new Copyright Bill has been approved without the inclusion of the blank tape levy. The larger recording companies have been trying to apply pressure for the inclusion of the levy in an attempt to recoup some of the lost revenue caused by home recording of copyright material such as music and video. Despite strong counter appeals from a pressure group, the Home Taping Rights Campaign, the levy has kept looming around the Bill at all stages of its passage through Parliament.

The problem which led to the omission of the tax lies in the fact that not all tape recording involves copyright material. Organisations such as the Hospital Broadcasting Service and those producing tapes for the visually handicapped were threatened with additional financial hardships.

Although the prospect of increased revenue appeared to the recording

industry, the software sector was less welcoming. Before the exclusion of the levy, it looked as though there would be no provision for software houses within the Bill, and this was just one of many reasons for the levy's demise.

The Home Taping Rights Campaign has been battling against the proposed tax since July 1988, just three months after it was proposed in the White Paper on Intellectual Property and Innovation.

On hearing the good news, Campaign Director, David Hall, stated, "The British Government has taken the lead in protecting the consumer and set a lead for other European countries to follow in rejecting this unjust tax."

Touchline: Home Taping Rights Campaign Office, Number One, Dean's Yard, Westminster, London SW1P 5NR. Tel: 01-799 8811.

Super Sale

Supersoft are giving away £30,000 worth of software to benefit Bernardo's. Supersoft's Peter Galver explains how the scheme will operate. "We have a large supply of surplus software from the last five years, and we want to put it to good use. Anyone who writes in to us enclosing a donation to Bernardo's will receive a program."

The good news is that the software is principally for the C64, but donors should state which computer they own, with their name and address. Just in case supplies run out, Supersoft would also like to know if you want your money back should there be no software to send. Please also enclose 42p worth of stamps to cover postage and packing.

All cheques and Postal Orders should be payable to Bernardo's and sent to:

Bernardo's Office, Winchester House, Cuning Road, Walsdown, Harrow HA3 7SQ.

Bernardo's stress that they are no longer merely concerned with providing 'homes' for orphans but are now involved wherever there are young people in trouble or children with handicaps. Funds are always essential to the organisation and David Waterbury, Director of the London and East Anglia Region of Bernardo's says, "We're very grateful to Supersoft. We hope that people will take up this offer and be as generous in their donations as Supersoft have already been."

Court Masters

Sometimes the hot competition for the position of top budget software house bubbles over into legal proceedings. The latest grudge match is between Code Masters and Alternative Software.

The issue is Alternative's re-release of CRL's *Formula One*, renamed *Formula Grand Prix*. Code Masters' claim is that the packaging plagiarises that of their own game, *Grand Prix Simulator*. According to David Darling of Code Masters, "Hancock we reserve the right to act, without notice, with the full force of the law, against anyone who imitates or copies any copyrighted aspect or feature of our products."

Touchline: Code Masters Software, Lower Farm House, Broomthorpe, Southam, Warks CV39 6DE. Tel: 0525/814152.

DATA STATEMENTS

New Online Service

Commodore PC users amongst our readers who are considering trying out online, may be interested to know there is a new UK based on-line service in operation.

Called the Direct Connection, it's a subscription-only service which caters for PC users. The software used to run the system has been developed in-house, and is extremely user-friendly. Subscribers can tailor the system to their needs by 'switching' various options such as menus, continuous scrolling, default file transfer protocol and so on.

Direct Connection is multi-user, and features a number of conferences. These can be compared with the more conventional 'topics' found on most BBS. However, with conferencing software, the commands to read, scan, search and send items are far more comprehensive.

Other features include a daily news bulletin (US origin), and an overnight fax service (dial only). To get a better idea of what's available, you can log-on to the Direct Connection with a demo account. Simply dial 01-823 8865 (data), and enter demo at the prompt.

The Direct Connection

MAIN MENU

- 1 Customer Assistance
- 2 Electronic Mail and User Directory
- 3 Communication Services
- 4 Overnight FAX Service
- 5 News and Magazines
- 6 Information Exchanges
- 7 System Services
- 8 Demonstration Section (demo users)
- 9 SIGN UP ONLINE

Smash Hit

Attendance figures for last September's Personal Computer Show have just been published and, yet again, they have broken all previous records. According to an independent survey, there were 99,000 visitors during the four days of the Show. Of these, 71,581 were business and professional visitors and a further 27,419 came from the trade sector.

The dates for the Personal Computer Show 1989 have already been set as September 27 to October 1, and the venue will again be Earls Court.



Packhorse, Grand Prix's new vehicle

Thunderbirds are Go!

Following on from the recent release of Pac-Mane, Grandream Entertainment have secured the rights to produce the computer versions of Gerry Anderson's Thunderbirds TV series and the Arnold Schwarzenegger movie, *The Running Man*.

In *Thunderbirds*, their arch enemy, the Hood, has a video of the Thunderbird machines in operation. The video must be destroyed if the heroic team are to maintain their anonymity, but there are still rescues to be performed while the search for the Hood continues.

The Running Man is set in 2018, where a game show exists for the punishment and execution of

criminals. Schwarzenegger's character, Ben Richards, is a fallen law enforcer who refused to open fire on a group of unarmed demonstrators, and his punishment is to be mated out in the horrific dungeons and caves before the eyes of viewing millions.

The caves are inhabited by maniacous terminators who revel in names such as Fieball, Dynamite, Buzzsaw and Subzero. The aim is to avoid the ring of their stunning array of weapons and escape, despite the shrieks for blood from the audience.

Packhorse: Grandream Entertainment, 1218 Paul St, London EC2A 4JS. Tel 01-247 6644.



Pac-Mane - the digital creature

DATA STATEMENTS

Amiga Software on MicroLink?

Database Publications, the company that operates the MicroLink service on Telecom Gold, is considering supporting Amiga software as part of its service.

Telesoftware on MicroLink is normally provided by the magazines that Database publish, but one factor that might prevent the introduction of Amiga Software is the time it takes to download, according to a spokesman, as Database Amiga files tend to be on the large size, even when ARCAD. This would mean that the time taken

to download an Amiga item would be quite considerable. However, since PC software (which is also quite large) is supported, this would negate that argument somewhat.

Raising MicroLink subscribers who would like to see the introduction of Amiga software on the system should mailbox Database on T3 MAG001 and express their opinions. Alternatively, write to Derek Meakin at Database, Europa House, London Road, Aylesington Park, Aylesing, Macclefield SK10 4NP.

Sweep Charity

Children in Need could benefit from a charitable bet between Cascade Games and bookmakers, William Hill. The gamble centres around Cascade's home racing predictor, *Form Master*, for which William Hill's have offered £M worth of free bets, the proceeds to go to the Charity.

The challenge commenced last November when the first bet was laid by Nigel Stevens, Managing Director of Cascade, and the home, Beau Rouge, romped home to win the 2pm at Haydock. Commenting on this initial success, Graham Sharp of William Hill's stated, "First blood to

Nigel but there's still a long way to go. However, most importantly, there is only going to be one winner - Children in Need."

Cascade is obviously extremely pleased with its successful take on a more optimistic view. As Nigel Stevens commented, "We are eagerly looking forward to round two, and we will be keeping everyone informed of the amount raised for Charity."

Footnote: Cascade Games, 1-1 Nevada Crescent, Marrogate, St Turin NG1 1AG. Tel: (0425) 121323.

Y2 News

Amiga owners who use RubyCom and/or RubyView, take note that new 'plus' versions are now available. If you sent off your registration cards when you purchased the packages, you should have received details of the upgrade scheme.

For those of you not in the know, Y2 Computing is renowned as being the top software house when it comes to producing custom software for the Commodore range of computers. The Ruby range of software was specifically written for the Amiga, and the latest versions incorporate a number of enhancements, including the ability to communicate directly with a modem, a better file requester and a facility for storing individual sets of macro keys.

RubyView, the viewdata package, also features an improved cut and paste pixel editor. Y2 Computing are on (0623) 30161.

CBM's Business Machines

Following on from the success of its lower-priced PCI computer, Commodore has further underlined its commitment to the PC market with the production of a modified version of its existing range. The new machine is simply the PC50/48 with a single drive instead of the 48Mb hard disk.

The new PC50 SD also allows flexibility if the customer wishes to upgrade by allowing the connection of proprietary hard disks or hard cards to suit individual needs and budgets. The substitution of the new drive effectively reduces the cost of the system by at least £160.

The PC50 SD with monochrome display costs £2399, £2349 with colour display, and the enhanced colour display version retails for £2699.

Footnote: CBM (UK) Commodore House, The Swissbank, Gasford Road, Malvernlink, Bucks MK16 7NA. Tel: (0628) 770668.

FT on Gold

The Xmodem file transfer protocol is about to be implemented on Telecom Gold, and it looks as if MicroLink subscribers will be amongst the first to make use of it.

The Xmodem file transfer protocol is by far the most widely used method of error correction amongst computers today. Up to now there has been no error-corrected method of transferring files to/from Telecom Gold, with the exception of MicroLink users, who have access to the Kermit FTP as request.

Telecom Gold has been experimenting with Xmodem (aka FT) for some time, and it's understood tests have been completed and the facility will be made available any day now.

However, as Xmodem is an 8-bit file transfer protocol, people wishing to use the facility will have to connect to Telecom Gold via the Packet Switched Stream (PSS), as this is also 8-bit, whereas the TD direct dial numbers are only 7-bit.

Besides the obvious advantage of being able to send error-free text to and from the system, binary file transfer will also be possible. Binary files (programs etc) that are sent to Telecom Gold are automatically converted to expanded hex, and can be mailed to another subscriber like any other mail item. When downloading, the reverse happens and the expanded hex file is translated back into binary form.

Supra Modem

The Commodore Computer Show held at the Novotel, Hammersmith, in November was quite sparse on the modem front. Even Y2 Computing, who are regular exhibitors at the show, didn't make an appearance. However, one item that caught my eye was the SupraModem 2400, which is being sold by Frontier Software.

At £199.95, the modem operates at three speeds - 300/300 (V21), 1200/1200 (V22) and 2400/2400 (V22bis) at European CCITT standards. This Hayes-compatible modem also features auto-answer/dial (tone or pulse) and a speaker, which is used to monitor the status of the line.

A free CompuServe (US on-line database) starter kit is also thrown in. Frontier Software are on (0423) 67148/330577.

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- DISK TO DISK ■ DISK TO TAPE ■

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THE PROCESS IS AUTOMATIC - JUST GIVE THE BACKUP A NAME.

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POST FREE

JUST LOOK AT THESE FEATURES...

- **TURBO RELOAD.** Action Replay Mk II has 2 unique Turbo Loaders - "Ramloader" & "Warp II". Both work at up to 28 times normal speed. That means that you can load a typical program (200 blocks) in around 0.5 SECONDS! Just imagine your backups loading completely independently of the cartridge in seconds instead of minutes.
- **PRINTER DUMP.** Freeze any game and print out the screen. Eg. loading picture, high score screen, etc. Works with most printers. MPS 801, 803, Star, Epson, etc. Double size, 18 shades, reverse print option. Very versatile - no user knowledge required.
- **PICTURE SAVE.** Save any 16bit color screen in disk at the push of a button. Compatible with Hasting Profiles, Koda, Artix 81, Image System, etc.
- **SPIRIT CONTROL.** Freeze the action - slow animations. Load, save and modify sprites in any program. Flip, reverse, delete etc. Customise your games. Kill sprite collisions - make yourself invincible. 64K operation.
- **POCKETIZER GENERAL. AN AUTOMATIC INFINITE LIVES GENERATOR!** Finds those games which make you invincible. Very high success rate - works with both old and new programs - stops you losing lives! No user knowledge required. Great fun!
- **MULTITAGE TRANSFER.** Even transfer multitage programs from tape to disk. The extra parts fast load - a unique feature. Subsequent disks required for multi-loaders (see below).
- **SUPER COMPACTOR.** Uses efficient program compression techniques. Each program saved as a single file. 5 programs per disk side - 10 programs per disk. If you use both sides.
- **TEXT SCREEN EDITOR.** Modify the text screen on a frozen program. Customise your games by adding your name to the title screen - change colours, etc. then make a backup. Also a great programmer's aid.
Fully relocated save, Fast format - 12 seconds. Built in the copy - works with long files. Built in 16bit copy - 1 or 2 drives. Read directory, read disk commands. Change disk name, device number. Load direct - no need for filenames.
- **SUPERFAST DISK OPERATION.** Load 200 blocks in just 0.5 SECONDS. Works with any program of any length. Works with multitag programs. Versatile - Backups, loads, Monitor. Works with all drives including IBM. Use both sides of disk (DSDF). Standard format - no file conversion required. Support save.

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Times of Lore



The quest is on to find a game that recreates the depth and magic of a role-playing game, yet will be played and enjoyed by the masses of arcade game players. *Times of Lore* is the latest attempt by these adventurers at Origins who created the *Dungeons* series of games (see *Origins II* in this issue) and is also the company's first cassette-based game.

The game covers the times when chaos ruled the land of Alboreth. The High King, drained and weary in battle, hides in the Elben caves to recuperate, leaving the land in the control of his steward Daniel, who is weak and unable to stop the many squabbles for power. To make things worse, orcs begin invading from the north. You play a brave young adventurer, and cast your role by selecting from three heroes during an illustrated opening sequence. You can be a knight in protective armour, a barbarian who can deliver a mighty blow, or a valiant wizard whose abilities are halfway in between.

You begin your destiny in an inn in the town of Erulan, but are soon put to task by a strange woman known as the Priest, who sends you to find the magical foresting stones - just one of the three magical items used by the old High King to maintain order in the land. This first quest takes you into the forest to the North and into battle with goblins, skeletons, and orcs, who hold the stones in their camp deep in the woods. Should you complete this task, many others lie in wait in this troubled land.

Although the top-down view of the main display will remind you of games such as *Gambler* and *Dandy*, this is nothing like them, and if you adopt that day-everything style of play, your games will end quickly. Instead, you should play it like a role-playing game, noting down clues, carrying out quests, asking friends for information and battling bravely with foes.

Below the main display, a scroll-like text window displays the messages from the other characters in the game, and below that are a series of icons activated by pressing the space bar and selected with the joystick. Through these icons you can talk to the serfs, guards and barons, examine

objects, cast a spell from a scroll, drink a potion, load a saved game or pause the game to offer an object to another character.

Despite the fact that you can do all these things, you don't have to type in a single word as everything is joystick controlled. When you talk to a game character - usually an innkeeper as they have more to say - you can inquire about rumours in general or specific objects, people or mysterious happenings. For example, if you asked an innkeeper if he'd heard any rumours, he might say that there have been strange noises as a subject to ask about. Ask again and the innkeeper may give information containing more of these keywords, say he knows nothing, or tell you of someone who may know more. It's then up to you to decide which leads to follow.

Sooner, rather than later, this will lead you into combat with a monster, which is decided with simple joystick presses. Against most monsters, two or three hits should do the job - however, some may take more. They're usually unarmed, but you may find some have weapons, such as a throwing dagger or a bow. Your strength is depicted as a candle, which burns down as you move, and when you're hit in combat, but it can be replenished by sleeping it off in an inn, or drinking a magic potion that you find on a defeated foe.

I've been playing *Times of Lore* for several hours now, so it's just as well that you can save the game (by sleeping in an inn), as there are between 200-300 hours exploring left to go. I have now travelled the length of the land, and have a stack of rumours to chase and quests to fulfil. Apparently there are 15,000 different server locations to explore, so really I've only just scratched the surface, but I'm hooked already. Time will tell how many arcade gamers are enticed by the game, but it's sure to appeal to role-players like myself. T.M.

Verdict:

Title: *Times of Lore*. **Supplier:** Origins (Microprose), 2 Marky Place, Erbury, Glou., GL8 8DA. TEL: 0666-54326. **Price:** £14.95 (disk), £9.95 (tape).

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Can Data! turn your study into a studio?

By Kevin Crosby

Sound

There are a lot of things for which computers can be exceptionally useful. Music is one of those things, particularly when delving into the world of MIDI. Today's computer-based sequencer packages are a standard feature in most professional studios and are responsible for much of what we hear in the charts.

Data! Electronics have taken this theory one stage farther by attempting to replace two pieces of hi-tech music hardware with disk-based equivalents, namely the drum machine and the sampler. So can the humble C64 replace Linn Drums and Fairlight? Well, sort of.



Sound Sampler - Rear display

Data!'s Digital Sound Sampler comes as a hardware unit, which plugs into the user port, and a disk on tape containing all the utilities required to drive it.

The hardware unit has four points of interest on the back. Firstly, there are the two input sockets. No, the unit isn't stereo, one is a microphone socket and the other is a line input. The next socket is a line output suitable for hooking up to a hi-fi amplifier or a tape deck. Alternatively, you can use



Sound Sampler - All display

the lead provided to connect the line output of the sampler to the audio/video socket of the C64. In this way you can hear the sound of the sampler through your TV. Users of monitors will need a jack-to-phono lead to do the same trick. This is stressed as a practice measure in the manual and they advise hooking to an amp for the best results. All three sockets are for standard jack plugs, which is a common enough practice in musical circles.

The final rear-mounted facility is a relay control knob which is used to vary echo feedback which I shall explain later.

On loading up the software, the screen displays a set of menu options in a basic but adequate manner. First you'll need the set-up menu which allows you to select the sample frequency, the amount of echo you want to add (if any), the recording trigger level and MIDI switch which allows you to trigger the sampler from a MIDI instrument with the aid of the Data! MIDI interface which plugs into the cartridge port.

Data! obviously don't like to even

up to what the sample frequencies actually are because they are specified by values between one and eight (one giving you one second of sample time, eight giving you nearly three seconds worth). The actual sampler audio bandwidth seems to be around 10KHz which is about the same as cheap audio tape. There is also an awful lot of background noise even when I hooked the unit up to a decent amp and used studio quality headphones. Not terribly impressive but you can't really expect too much from a £50 piece of hardware.



Sound Sampler - Keyboard

On the plus side you can reverse and edit samples once they are stored in memory and the overdub facility allows you to overlay one sample on another. Furthermore, you can use the sampler as a basic real-time echo unit which is fun but, again, not really usable for actual musical applications.

In short, this is a nice toy and a good introduction to the world of sampling but serious computer musicians should forget this as a cheap alternative to a proper piece of dedicated hardware.

Investments?



Com-Drum - Composing screen

Hit that perfect beat

Using similar technology, but to different effect, there's Datal's Com-Drum which, as the title suggests, is a desk-top beatbox. Once again we have a combination of disk or tape software with a plug-in unit that looks almost identical to the Datal sampler. Not so many ins and outs on this one though, just a line level output and a trigger output which allows a crude form of interfacing with proper drum machines or older CV/Gate style units such as the Roland SH-101.

In its favour, Com-Drum allows you to load in and save drum patterns and drum sounds, so a comprehensive library of different kits can be collected. Presumably Datal will spot the potential market for 'best of' drum machine disks.

Of course, you're not just limited to straight drum sounds. If you have the sampler as well (which seems to be expected of you as both products share one owners' manual) you can part sample across. Your drum patterns could contain vocal snatches, synthral stabs, cracked shenkrys, anything. In fact the combination of

both products could be marketed as the Hip-Hop Construction Set (no charge for the idea folks!).

All well and good so far but here's where a few snags crop up. Most importantly, the sound quality was not too hot, although some sounds were better than others, so it could be that Com-Drum is best used for a limited range of sounds. It could also just be down to personal taste, I suppose.

There was also the problem of background noise which, although tolerable when fed through the TV, became very annoying when put



Com-Drum - Strip editor

through my studio amp. The only way around this would be to buy some form of noise gate which cuts the sound when the signal drops below a certain level. A cheap foot pedal model will cost between £30 and £60.

Programming Com-Drum couldn't be simpler. You have the option of real-time or step-time recording. I found the best way to enter patterns was to record in real-time and correct errors and add fiddle bits in step-time.

Although you can have up to eight sounds to a kit, you can only have three of them playing on the same beat,

which could actually be quite a serious limitation because even the most basic of disco-drum patterns will have at least a bass-drum, snare and hi-hat on the same beat which means that any non-fill that goes over those particular beats will be lost.

Once you're happy with a few patterns, you can arrange the patterns into songs. It's possible to arrange a standard pop song using five patterns: intro, verse, chorus, middle eight and outro. These can be used once or looped a number of times whichever is required.

As with the sampler, Datal seem to hate using standards which give anything away. With Com-Drum the tempo is not measured in BPM (Beats Per Minute) but in some nondescript set of numbers. The equivalent of 120 BPM seems to be somewhere in the early 200s.

To me, this is also a nice toy but will no doubt lose its appeal if the user starts to take music more seriously. Having said that, the combination of the sampler hardware/software and the Com-Drum software (which Datal will sell separately) may well do a lot of good introducing newcomers to the world of music.

Finalities

Products: Digital Sound Sampler, Com-Drum. **Supplier:** Datal Electronics Ltd, Penton Industrial Estate, Gosson Road, Penton, Stoke-on-Trent. Tel: (0302) 74707. **Mailings:** C64/128. **Price:** Sampler £49.99, Com-Drum £29.99. **Com-Drum Software (for Sampler):** £9.99.

SONIC EX

By Tim Walls

Sound on the 64 is far from easy, and many first-time users can find it a daunting task just to get the simplest sounds out of the machine. This program will hopefully change that. It will let you make some quite impressive sound effects with the minimum of effort and, when you have created the effect, will automatically convert it into a short Basic program.

HEAR SOUND: Will allow you to hear your sound.

DESIGN SOUND:

SET FREQ: Sets frequency for sound.

SET ADSR: Sets Attack, Decay, Sustain and Release.

SET VOL: Sets volume of sound.

SET WAVE: Sets waveform of sound.

SET PULSE: Sets pulse width (pulse wave only.)

Output Sound:

SCREEN DETAILS: Will display all details of sound.

PRINTER DETAILS: Will print details of sound.

SAVE FRAME: Will save frame to tape.

LOAD FRAME: Will load frame from tape.

Getting it in

The program is in Basic. Please refer to our Listings page before typing it in.

IMPORTANT: After running the program always use option four of the main menu first.

Put SID to work with this powerful sound effect designer

Running it

When you use the program, the first thing that you will see will be a small box saying something like: Clear memory, Y/N

If you already have some sounds in memory, press 'N', otherwise press 'Y'.

Summary of Commands

Hear sound:

REPEAT: Switches repeat on/off.

SET REP. DELAY: Sets times between repetitions.

SET NO. OF REP. S: Sets number of repetitions.

Incorporating sounds

To convert a sound to Basic, choose **CREATE BASIC** from the main menu.

To incorporate a sound into your own program you can use one of two methods, depending on how many sounds there are.

METHOD 1 (for one sound only)

* Clear the screen and list your sound.

* Enter **NEW**.

* Position the cursor at the top of the sound's program.

* Press **RETURN**, continue pressing until all the lines have been re-entered.

* Now use the merge routine supplied.

METHOD 2 (for more than one sound)

Type in the following listing:

```
60000 REM *Block delete*
60010 F=(12*98200)/(PRINT$(147))
60020 PRINTCHR$(18)F:F=F+S:
PRINT*60040 F#F#T#T#S#S
PRINT*GOTO 60040*
60030 POKE 63,19:POKE63,19:
POKE63,19:POKE63,19:POKE63,19:END
60040 F:=0:T:=0:S:=0
60050 IF F T THEN PRINTCHR$(
147):END
60060 GOTO60020
```

Now type **RUN 60000**(RETURN) The program will now delete itself, but this is very slow, so leave it overnight or something.

Merge routine

To merge two programs together follow these instructions.

- * Save the sound programs.
- * Load the main program to be merged.
- * Enter the following:
POKE251,PEEK(43)+POKE252,PEEK(44)
A=FEEK(45)+PEEK(46)+256*J
H=INT(J/256):L=A-256*H
POKEH(45):PEEK(44),J
- * Now load the sounds.
- * Enter the following:
POKE 43, PEEK(251)+POKE44,
PEEK(252)

The programs are now merged and ready to be saved to tape or disk. To use a sound in this state just **GO SUB** the appropriate line number.

Games Update

Blip — Video Collection

How many people can remember the old black-and-white pong games that were available for TVs a number of years ago? Well if you can remember that far back (I can't — Ed), you'll no doubt remember the extremely crude graphics and very poor sound that accompanied what was a very popular game.

You may think that this type of game is a thing of the past — but Silverbird have other ideas they've just unleashed the horrors of pong as an unsuspecting budget-buying public.

Blip offers the games player a chance to try their hand at any one of six games, each one of them a variation on pong. Some of the games will be familiar to those whose memories extend as far back as the pong consoles, others will be totally new. Pong is the original game. With one bat on either side of the screen, the idea is to knock the ball at your opponent and hope that they miss it, giving you the points.

Colour and sound have been added to this and all other games in the collection, and the addition of a one player-vs-computer option widens the appeal. Football gives each player control over two bats, one bat moves up and down the edge of the screen as with

pong, while the other one has the added ability of being able to move across the screen as far as what would be the centre line.

In *Squash* too, both bats are on one side of the screen, the idea being to bounce the ball off of any of the three on-screen walls, and hope that your opponent misses it as it moves towards the screen edge. *Soft Squash* is practically the same but, with only one bat, more of a practice mode than a game.

Four Bar Blip was a totally new one on me. One player has control of bats at the left and top of the screen, the other has bats at the right and bottom. The idea of the game is to prevent the ball from going off of any screen area that your bats protect. This is probably the hardest game to master.

The final game in the



collection is *Asteroid*. Despite its fancy name, this is just another version of pong, with a number of objects, asteroids, moving up and down the centre of the screen. If the ball hits one of these objects then it could bounce off at any angle — even back to the person who had just hit it.

I must admit that of all the games that I had the chance to look at for this issue, this is the one that I enjoyed the most. Perhaps this is due to a little bit of nostalgia, but it is more likely due to the fact that pong and its variations are great fun to play.

Fourlines:
Title: *Blip — Video Classics*
Supplier: Silverbird, 1st Floor, 44-50 New Oxford Street, London, WC1A 1PS. Tel: 01-779 8753. Price: £1.99.



Landerboard

How many times can a game be redesigned and repackaged before people stop buying it? *Landerboard*, which originally appeared in the UK on an Access/UK Gold Label, proved so popular that various improved versions were launched. *Landerboard* itself has been available in various packages since its original launch. Now at long last, it's made its way onto a budget label.

Landerboard offers any games player quite a challenge. On your way around the course you will have to choose your club, allow for any wind that may blow your ball of course and compensate for any slip on the putting green — if you ever get to one!

Even though I'm not a golf fan, and I've got no idea which club does what, I've always found *Landerboard* an extremely entertaining game. Now that it's available at a budget price from Kixx, you have no excuse for not having this excellent game in your collection.

Fourlines:
Title: *Landerboard* Supplier: Kixx, Swan Chambers, 1111 Street, Chingford, Cheshire. CM72 7AR. Tel: 0280 299025. Price: £1.99.

Game Set And Match

The pre and post-Christmas games markets are always flooded with various compilation packages, and this year is no exception. However, if you're a sports fan, the *Game Set And Match 2* will stand out from the crowd.

The package consists of 10 different sporting games, many of excellent quality - indeed some have held quite high positions in the software charts as full price games.

The games offered in the package are: *Winger* (Olympic), *Championship Soccer*, *Track and Field*, *Steve Davis*, *Snooker*, *Super Hoop* (On), *Superbowl*,

Match Day 2, *Ice Hockey*, *Test Match*, *Kick Paddle*, *Play The Open* and *Basket Master*.

Game Set and Match 2 offers an excellent family collection, there will no doubt be a game in the pack that will suit every member of your clan. A great collection to spend those dark winter nights with.

Features:

Title: *Game Set And Match II*. **Supplier:** Ocean, 5 Central Street, Manchester, M2 7NS. **Tel:** 061-832 6411. **Price:** £12.99 (taxi).

Fast Break



It's the Jammers against the Slamblers, and it's the fourth quarter. You've already lost your star forward through six personal fouls - it's been that type of game. Now you've got to call the plays to break down the defence and score some baskets, as you're still trailing 68-75.

There have been basketball games before, but only this one from Accolade (via Electronic Arts) combines the arcade action with coaching decisions - timing substitutions, calling offensive and defensive set plays, and so on. It even includes an option to devise your own special play.

The action is played in 3D on a screen that flips from one end of the court to the other, between two teams of three (with a squad of six to pick from). As in most of these arcade sports games, you play one of the players, but can swap control to another by pressing the joystick button, which is also the means of passing the ball. Holding the button and then releasing it gives you a jump and shoot move.

In defence, you must try to steal the ball without charging or fouling your opponent - you can also intercept passes and jump to block a shot. However, this game goes further than just arcade playing, as you can call offensive and defensive

plays to try and outsmart a team. These set out defined running and passing patterns for your team to follow, but you can also define your own by plotting four positions for each of your three players. Just call it when you have the ball at the halfway line, and then see how well it works. If it goes wrong, you can always call a timeout to plan another.

Each player is rated for his speed, inside and outside shooting, passing and ball handling skills, and they're all paired off into alternatives for the centre, guard and forward position. It's up to you to plan the strategy and carry it out.

It's a shame that there are only two teams included on the disk, as either will give the novice player a punching that might just put him off the game for good - you have to practice to stand any chance at all. Perhaps Accolade are planning a team construction disk, a feature just released for 4th and 5th order through which you can build up your own team. Overall, *Fast Break* is one of the best basketball games you can get, but there's still room for improvement.

Features:

Title: *Fast Break*. **Supplier:** Accolade (Electronic Arts), 11-49 Stanton Rd., Langley, Berks., SL1 8YN. **Tel:** (0753) 49442. **Price:** £14.95 (taxi).

Caveman Ugh-Lympics



Just when you thought you'd be spared the Olympics for another four years, Electronic Arts have released *Caveman Ugh-Lympics*, a stone-age version of the modern game, but without any dope testing. Up to six players can compete in six different events - tossing your man, hitting each other over the fence with large clubs, racing dinosaurs, making fire, being chased by sabre tooth tigers and vaulting over dinosaurs.

The format is the fami-

lar one of waggling your joystick as fast as possible in the required direction, interspersed with the need to time certain manoeuvres correctly. The graphics are excellent - cartoon quality - but after the initial appeal, your attention is likely to wane quickly.

Features:

Title: *Caveman Ugh-Lympics*. **Supplier:** Electronic Arts, 11-49 Stanton Rd., Langley, Berks., SL1 8YN. **Tel:** (0753) 49442. **Price:** £14.95 (taxi).

By Fair Means or Foul?

It's a puzzle as to how Barry McGuigan got himself involved in the professional publicity for this boxing simulation. As the title suggests, *By Fair Means or Foul* is not entirely played by Marquis of Queensberry rules. You would have thought that Baz, who is not particularly noted for dirty play, might have stayed clear of such a slur on his professional reputation. Large cheques can, of course, account for a lot.

Be this as it may, BFM&F may provide some diversion for lovers of contact sport simulations. Besides the usual fair moves (head punches, body blows,

upper cut) and dirty punches, there is a range of four foul moves: head butt, knocking, kicking, and the indispensable groin punch. Of course, the latter moves cannot be used if the ref is looking, under pain of disqualification - but the moment his back's turned...

Superior has at least tried to introduce an element of variety into this other state game. I think that fans of fair boxing may, however, find it a little below the belt.

Title: *By Fair Means Or Foul*. **Supplier:** Superior Software Ltd, Regent House, Skinner Lane, Gresham, Lincs. **Price:** £14.95 (UK), £19.95 (over).



Footballer of the Year

This is like a mixture of an Epyx-style *Games* simulation mixed with *Football Manager*. The start of the game sees you, at the age of 17, as an aspiring young player with just £200 to your name. The object of the game, of course is to climb the ladder to fame and fortune.

Much of the game consists of financial transactions. You may, for example, buy cards which will be of later advantage. A transfer card may give you the chance to transfer to a more prestigious team, while goal cards give you a lot more chance, in the playing sequence, of scoring goals. Incident cards, which cost

£200 each, are random, something beneficial may happen, but it's a bit of a risk.

The arcade sequence pits you against a defended goal, and it's basically an archery shoot. Your goal cards may help you out here.

Footballer of the Year is a very lightweight game and may appeal to younger game players. There wasn't enough in it to hold my interest for long.

Features:

Title: *Footballer of the Year*. **Supplier:** Gremlin Graphics, 32 Ludgate Hill, Birmingham B3 1JH. **Price:** £12.95 (UK), £16.95 (over).

Powerplay

Current version of the most highly-rated Trivial Pursuit clone, *Powerplay* adopts the unusual viewpoint of seeing the general knowledge quiz as a cosmic battle between the Greek gods. Successful answers mean that the player can move one of their deigned pieces across a multicolour board. The intention is to challenge one of the opponent's pieces and hopefully eliminate them.

Powerplay is an engaging little game, but strictly

lighthearted, which may be no disadvantage in a budget cassette version. Doubts linger about the size of the question 'database' - this only goes to three levels of difficulty - and some of the questions may have needed a little more research.

Features:

Title: *Powerplay*. **Supplier:** Players Software, Caffery Park, Aberystwyth, Berks. **Price:** £12.95 (UK), £17.95 (over).

Gary Liniker's Superskills



I certainly seem to be the reason for football-based games, although software houses are not usual faced with the fundamental fact that computers are better adapted to single-player use, so football in its full glory is a tad difficult to convert convincingly. Gremlin's way of getting around this constraint is to stress the training aspect.

Superskills puts you through a demanding and unexciting series of gym and field trials and rates you accordingly. In the gym, you are asked to perform push-ups (hardly the most exciting of competitive activities, I would have thought), squat thrusts (purs!) and weight training (picking up a bit) and a work-out on the parallel bars (so-so).

Things get a little more exciting in the field, which requires you to do a fair bit of stalem work (juggling, chipping and shooting) and also tests your ability to take penalties.

At the end of all this, you get the chance to try for a real goal. Should you achieve this, you can have a go at kicking a ball through the middle of an old tyre. A gusting wind may make this harder than it sounds.

If you're a soccer fan, you may enjoy this.

Features:

Title: *Gary Liniker's Superskills*. **Supplier:** Gremlin Graphics, 32 Ludgate Hill, Birmingham B3 1JH. **Price:** £12.95 (UK), £16.95 (over).

Supersports — The Alternative Olympics

Okay, so we've all had more than our fair share of Taek & Field type games, particularly during the summer months of last year. Now it would seem that Gamelin has decided to use a similar format but with different sports.

Supersports consists of five events which can be attempted individually or as a set. First of the five is 'Crack Shot' which is a shooting gallery set in an alley. Various points are awarded for static or moving or thrown targets and points are deducted for shooting alley cats.

Next we have the 'Dare Devil Dive', here you can adjust your desired height (40-400 feet) and dive into a small area of water doing as many tricks as you can to obtain style points while keeping your shadow over the water for accuracy points.

Thirdly we find ourselves amid a 'Star Smashing' contest. You have one minute to kick and punch your way through as many stars as possible. Mind expanding stuff!

Then there's 'Cross Bow' which, as the name suggests is yet more target practice for budding rider drinkers.

And finally we have the grand 'Underwater Assault' Course. Yes that's right, the Krypton Factor with flippers.

All in all not a bad selection of sport, but I do feel that the novelty will wear off quite quickly.

Touchline:

Title: Supersports. **Supplier:** Gamelin Graphics, 21 Ludgate Hill, Birmingham B3 1JH. Feb. (821) 248 8748. **Price:** £8.99 (incl.) £14.98 (incl.).

Guerrilla War



Yet another Best Warriors/Commando clone emerges. This one is from software stalwarts Imagine. And once again a software house can truthfully say that this is not a rip-off but officially licensed from an arcade colleague, this time from a relative unknown manufacturer SNE (Shin Nihon Kikaku) Corp.

Nothing particularly unique in this version apart from the fact that you can rotate your trooper's body left and right while still moving forward. This is achieved by using the X and Y keys on the keyboard or by moving in a Cheetah 123 joystick, although personally I wouldn't buy one purely on the strength of this game.

It certainly isn't the best version around, thanks largely to the Spectraesque graphics and the sluggish gameplay.

Touchline:

Title: Guerrilla War. **Supplier:** Imagine Software/Orion, 6 Central Express, Manchester M2 5NS. Feb. (861) 872 6821. **Price:** £8.95 (incl.) £12.95 (incl.).

Power Pyramids

There have been many myths surrounding the great Pyramids, Quetzlcoatl (under the Great Sphinx umbrella) has added one of their own in the form of the game.

In *Power Pyramids* you're a kind of intergalactic Barron Humesnap who sells pyramids to various planets, in this case Earth.

Before your sled takes charge of the pyramid, you have to make sure that all the levels are powered up and fit for use which involves

sending a little blue ball round the place reaching on to the power. Yes you've guessed it, what we have here is a levels and ladders Jet Set Willy style graphic adventure, what more need I say. 128 screens, pleasant graphics and sound. Good lot in type.

Touchline:

Title: Power Pyramids. **Supplier:** Gremlin Entertainment, 12/18 Paul St, London EC2A 4JH. Feb. (87) 6434. **Price:** £8.95 (incl.).



Tape Menu

Want to know where your cassette are files are stored?

This utility takes all the angst out of the process

By J J Brotherston

In those dim dark days when all I had was a computer and cassette, the convenience of this program was developed. It displays a list of all the programs contained on a tape, in much the same format as a disk directory. It was a little simpler than the present version, but, with tape turbo making storage more efficient, I have extended it considerably.

I use it mainly for storage of backup programs, held on C90 cassettes. I have therefore made allowance for up to 30 programs to be stored.

In its present form the program displays a directory of the programs held on any particular tape, and will automatically fast forward to the start of any program selected. It also provides an automatic facility for Basic programs and will line the tape up ready to save a selected program. Of course it can't do this all on its own. It needs you to put in the trip counter details from your cassette, program number and program name first. These are held in the DATA statements.

Even now that I have a disk drive, I still keep my backup copies on tape, so the program still gets well used. In the interests of speed, it is best used with a tape turbo of some sort, such as the program given in the November 1982 issue of *Your Commodore*.

Tape Menu should be the first program on your tape. It's fairly friendly, but not completely foolproof. It can be customised, and to this end I have included a list of the variables used, and what they do. Once you have filled in the details of your programs, you will, at some time, want to either add, change or delete some details. Once you have made these changes, reuse Tape menu over the original. Don't worry, the DATA statements have been padded with spaces so that when you reuse, the next program on the tape will not be overwritten.

Once you have your programs saved, and have placed the relevant details into Tape menu, just follow the on-screen instructions. There are just a couple of restrictions. You have to start with a blank tape. You can't just tack the directory onto the beginning of any tape and trust to luck. The timing for the fast forward (lines 440 - 480) is set for my cassette unit, and cassette units do differ slightly in their speeds. Even so the counter readings should be within acceptable limits. If they are not, a little judicious adjustment of the '14.75' in line 480 should do the trick. Increase it if your cassette counter is lower than that held in the program, and decrease it to adjust the other way.

I have found this to be an invaluable utility for about four years now, and I hope you will find it equally useful. You can customise it in various ways, and here are just a few suggestions.

The title of the tape can be changed. This is held in line 50.

In line 40 the variables F and L can be altered to define the total number of entries and number of lines to each page. If you change F, don't forget you also have to change the number of DATA statements as well. Also, if you go over 30 entries, you will need to alter line 658, to increase the number of pages available. You don't however have to worry about the number of lines fitting exactly onto a page. If you don't have a full page it will be padded with blank lines.

You can also change the on screen messages and colours to suit your own taste, or do away with some of them altogether to shorten the program.

Well, there you have it. Here are the list of variables I promised.



Variables used:

- P - This tells the program which page you are on.
- F - The total number of entries held in the directory.
- L - The number of lines per page.
- N - The program number used by the program.
- NS - The program name as given in the directory.
- S - The trip counter reading at the start of a program.
- E - The trip counter reading at the end of a program.
- I - This is used to step through 'READ' statements etc.
- AS - The first digit of the program number selected.
- BS - The second digit of program number selected.
- QS,TELS - Selects your choices of 'SAVE,LOAD,RUN, etc'
- C - For comparison to the computer's internal clock.
- K - Space taken up on tape by TAPE MENU.
- T - For comparison to the computer's internal clock.

Getting it in

The program is 100 per cent Basic code. For help typing it in, refer to our Listings page.

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The Konix Navigator is an outstanding new pistol-grip stick with a smooth, superior performance that's bound to impress. It will retail at £14.99, but we're giving away ten of them free to the lucky winners of our competition.

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The analogic switch doesn't operate until the trigger is held, which makes a perfect fire-mouse games, and avoids the possibility of overshooting through score tables and menu screens. In short, it's an excellent joystick that's well worth winning!

How to enter

Simply study the two cartoons on this page and find the two differences between them. When you think you've found them all, fill in the entry form, and remember to also write the number of differences of the back of the envelope, otherwise you won't be accepted. Send your entry to the address on the form by February 28th, and keep your fingers crossed.

The rules

Entries will not be accepted from employees of Angus Specialist Publications or Konix. This restriction also applies to employees' families and agents of Specpro.

The entry instructions form part of the rules, and the Editor's decision is final. No correspondence will be entered into. In the event of a postal strike, we reserve the right to extend the closing date.

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Commodore Amiga



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DISCOVER AN ARCADE ADVENTURE WITH HIDDEN DEPTHS

Discover Times Of Lore, Origin's first adventure on cassette. Acclaimed British designer Chris Roberts has taken the best of arcade and adventure – fast and ferocious combat, stunning graphics and animation, unrelenting danger and challenge – and introduced the depth of a classic fantasy role playing game.

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C64/128



Spectrum



Amstrad

Journey through an immense world of cities, dungeons and a stunning variety of natural terrain.

ORIGIN

Origin, MicroProse, 2 Market Place, Teffbury Glkos, GL8 8DA, Tel: 0666 54326

Emlyn Hughes

Here's a game of 90 minutes that will provide end-to-end action for both human and computer players, and leave you feeling either over-the-moon-brain or as sick as a parrot.

First reactions from anyone seeing a screenshot of this game will be that *EMYS* is an *International Soccer* clone, but on closer inspection this game goes a lot deeper, with individual player statistics, league and cup competitions and intricate ball-control that you must perfect if you're going to win anything.

EMYS isn't the most friendly of programs - the game opens with a blank screen, except for a compassed bar at the top. Moving the joystick-controlled cursor to the top activates four menus that allow you to define game options such as points for a win, minutes in a half, changing screens colours, selecting a team to play, picking the players from the squad who will play, and deciding whether it will be a league or cup competition or just a friendly match. Whatever your choice, you're restricted to eight teams, which is nice enough for a game in which the emphasis is on action, not management.

Once you've made your many decisions, the familiar *International Soccer*-style screen appears, but with

a few subtle differences such as advertising boards. Unlike *International Soccer*, *EMYS* uses all 11 players in a side - each has his own running, tackling, speed and fitness ratings that will affect how he performs on the field. The fitness rating is perhaps most important, as this is reduced for each match played, and particularly heavy tackles that can mean that your star player plays well before his best.

After only a few minutes, you'll begin to appreciate the extra control *EMYS* gives you over the player - instead of the usual press for pass or hold (or shoot style, you can set the speed, direction and height of the shot, pass or cross through relatively simple, joystick moves. So, with practice you can pass the ball with pinpoint accuracy across the field, lob crosses into the box and shoot from impossible angles.

When you haven't got the ball, you can either try and intercept passes, block the man with the ball or even slide in for a tackle, but you may end up giving away a free-kick. You also have more control over set pieces such as free-kicks, throw-ins and corners - a press of the fire button will mean the kick or the throw will be towards the player you control at the moment,

though you can leave it to the computer to work out the best place.

The action is accompanied by a cheering crowd, and a commentary in the form of a bar at the top of the screen that displays who has the ball, the name of the nearest opposing player, the goal scorers and the direction of free kicks and throw-ins. Unfortunately, this is most distracting, as it flashes just as you're concentrating on threading a pass through the opposing defence. It's not particularly accurate either - I was informed at one point that a player had scored after five minutes, when only four had passed on the game clock in a game with only five-minute halves. If they laid on these interruptions, they should at least be accurate.

Overall, this is a good expansion of the *International Soccer* type of game, but it will disappoint those looking for a full player management game. **T.H**

Trackline:

Title: *Emlyn Hughes International Soccer*. **Supplier:** Atlapoganic, Hovebever House, Canning Road, Maroon, WA3 7SL. **Tel:** 01-581 1308. **Price:** £12.95 (incl.) £9.95 (cash).





Quite simply, it leaves other word processors lost for words.

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Data Loader

This handy little utility should make the task of keying in Your Commodore listings an awful lot easier.

By D R Murr



We at *Your Commodore* realize how difficult a task it is entering page after page of listings, even though our checkouts should have made life easier. This program should make things a little better.

Data Loader lets you enter data bytes, of machine code or whatever, in blocks of any size you choose. So, if you pick our standard DATA line size of 16 bytes, that is also the block size. When you've entered a block, you can then enter the characters to validate it. The program also includes extensive editing facilities. Now read on...

Getting it in

Two versions of Data Loader have been provided - one for the C64 and one for the C128. Both are written in Basic. Please refer to our Listings pages to clarify the entry procedure.

Banning the program

Since the programs are Basic, simply LOAD and RUN them to get them going. Once you start the program, the

program heading will appear and you will be asked if you want to load an existing file into memory. If you don't want to continue entering data into a new file then you will be prompted for the block size (0-16). At this prompt you should enter the number of data items that are on the lines that you wish to enter minus 1 to allow for the checksum that appears at the end of every line in our listings.

Once the block size has been entered you will be asked if you want to enter the data in Hexadecimal or Decimal format. Following a correct response to this, you will be asked for the start address of the data to be entered. It is worth noting that if you are continuing entering data to a program that already exists on disk, the start address, block size, entry mode and the next address will all be displayed as soon as you have loaded in the program.

Once you start entering data you will see that the program keeps you informed of the block number that you are working on and the number of blocks that you have entered. Directly

below these you will see the ADDRESS and DATA column labels.

When you are ready to enter a new block type 'E'. You may then enter the relevant data. Characters can be deleted using the DEL key. The program will only allow you to use the keys that are used in your chosen entry mode (i.e. 0-9 in Decimal and 0-9 plus A-F in Hex mode).

Each time that you finish entering a line of data, the checksum of that line will be displayed allowing you to compare it with the listing that you are entering.

Should you wish to modify any block that you have entered you can do this by typing 'M'. Use the delete key as normal to allow you to change data items.

Pressing the 'N' and 'P' keys allows you to view the Next and Previous data blocks. The 'U' key allows you to GOTO the data block that you specify. The ESC key in C128 mode and the F1 key in C64 mode act as abort commands returning you to the main menu.

It is possible to delete blocks of data with the 'D' key. This takes some time, as once the data block is removed the rest of the data entered is moved down into the space that has been opened. The option of delete is of course insert. The 'I' key is used to perform this function. This function will cause all data after the point of insertion to be moved up by one block.

It is of course possible to make a mistake when deleting data. You will be pleased to note that the 'R' key will recover the last data block that was deleted and insert it back in its respective place in memory.

Once you have finished typing in your data, or you simply want to have a break, you will of course want to save your work. Pressing the 'S' key will activate this function. If the filename that you choose already exists on disk then you will be asked if you want to overwrite it.

When you want to leave the program simply enter 'Q' for quit.

'DATA LOADER V64' saves the

data by first saving the Start Address (as per a normal program file) then the End Address +1 in low byte/high byte format, then the data blocks, then finally one byte which is the Block Size and Mode. 'DATA LOADER' loads and saves the data using the 'LOAD' and 'SAVE' commands.

To convert the 'DATA LOADER V64' files to a normal program file, a companion program '4 DATA - PROG' is used to load and save the data file without the End Address bytes. This program may also save the data file with a different Start Address selected within the set range. This is desirable where you may want to load the data file into a lower memory location and not be restricted by the address ranges in the 'DATA LOADER V64' program. The file may be saved with a 'W' sign added to the loaded file name or changed as desired.

To use the data file in a program it may be loaded within the program by the command `LOADFILENAME` (for 128) or `LOADFILENAME*,1` (for 64).

Don't forget to include a flag in your 64 program when using the 'LOAD' command.

That's it! As you can see the programs above will be an indispensable tool for those programmers who don't want to type in a large number of basic data statement lines. Also it is a lot faster to have a boot program loaded which then loads the data file directly into memory than it is to load a program which contains a large number of data statements which it then reads and poles into memory one by one.

Note that in other magazines the programs listed sometimes are in hexadecimal which is no problem, however the checksum at the end of each line is not just the simple addition of data statements of that line. Also some programs listed have no checksum where this is the total addition of all the data statements. Sorry, but we cannot have everything! It is good to see that the program listings in Four Commodore are in a standard format.

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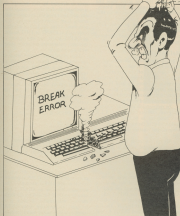
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First Steps

When an error message appears on the screen the greatest culprit is the programmer.

By Norman Doyle



There's nothing more irritating than the sinking feeling you get when a program is chugging along nicely and the screen scrolls up a few lines to reveal an operational error message. What's even more annoying is the knowledge that ten times out of ten the programmer is at fault rather than the program!

Planning is part of the secret of producing perfect programs. These that just grow, rain out like the plumbing in my house. Whenever I

turn on the tap, water of the correct denomination appears instantly, the central heating circulates well and the toilets flush perfectly - but all is not well now that I want to change things to suit all my new needs.

The problem is the rather inelegant way the plumbing resembles a collage of pipes conceived during Picasso's wilder dreams. As Cuban sculpture, it's fine until it comes to untangling the mess and I'm now in danger of flushing with hot water and filling my kettle

from the central heating system! One false step and the result is chaos.

So it is with Topex programs. If your program just 'grows' and you want to make a small change there are the errors you could meet:

NEXT without FOR

When a FOR/NEXT loop has not been closed properly because a next statement has been omitted, or in some way avoided, through bad program structure, the operating system cannot trace back to the FOR statement and this error is generated.

Apart from carelessness, problems can be caused by various syntax problems. Take this example of badly nested loops:

```
10 FOR A=1 TO 100
20 FOR B=0 TO 7
30 NEXT A-NEXT B
```

The A loop will execute without any problems but, when the program meets the NEXT B command, the program jumps back to line 20 and then tries to execute the NEXT A on line 20 again. Since the operating system has declared the A loop finished and forgotten, the error message is generated.

If the variable tags A and B had been omitted from line 20, the program would have executed without any problems. This is one case when perfect syntax isn't necessarily the best policy!

RETURN without GOSUB

The routines associated with GOSUB are often launched at the end of most programs. This is a situation when the END statement should always be inserted before the first suboutine. If this is not done the program reaches the logical end of the program but then runs into the suboutine, finds RETURN and has nowhere left to go so the error appears.

```
10 GOSUB 20
20 REM THIS IS WHERE END SHOULD BE
30 FOR A=1 TO 10
40 PRINT A
50 NEXT A
60 RETURN
```

Out of DATA

This is the bane of Basic adventure programmers or machine code program loaders. Often the cause is

difficult to trace but usually it's an extra comma at the end of a DATA statement or a full stop instead of a comma within one of the many lines.

In my experience, the best way to track down the problem is to add a few lines at the end of the program which read the data and prints each item to the screen. For example, if there are 312 items of data the extra lines would be:

```
60006 FOR A=1 TO 312
60018 READ A$
60028 PRINT A$
60036 GET B$;IF B$<>CHR$(32)
THEN 60050
60040 GET B$;IF B$<>CHR$(13)
THEN 60040
60050 NEXT
```

By running this with RUN 60000, the data will appear. Watch for any blank lines or unexpected results and press the space bar to halt the program. Check the DATA and then press RETURN to continue. You'll soon see if the DATA is incorrect or if there's an item missing.

Out Of Memory

Officially, this means that the program is too long for the memory space allotted to it. Always bear in mind that the program memory also includes the space reserved for variables as well as the program itself. A sure way to overrun the computer is a one line program is to try this:

```
10 DIM A$(255,255)
```

The memory isn't large enough by a long way. Be careful when using arrays, they can fill a program before it gets past the first line.

Another way to generate the error is by loading a machine code routine to 49152 and then trying to load a Basic driver. Always follow a high memory load by NEW, it won't hurt the loaded program and resets the pointers ready for a normal Basic load.

Unde'd Statement

This appears when a GOTO or GOSUB statement tries to jump to a non-existent line. A line may not exist for one of two reasons; it may have been missed in error or it may never have existed in the first place.

The latter case is easily corrected but the former may not be so easy if the disappearance of the line is due

to the use of a remamber routine which does not update jump instructions.

Another reason could be through the elimination of REM statements. Many programmers get into the seemingly neat habit of placing subroutines at lines such as 1000, 2000 etc. Lamentable though this may be, they then indulge in the equally good practice of turning the first line into a REM statement to label the routine. The mistake is to use the REM line as the jump address, as in GOSUB 2000, when the first active Basic line may not start until line 2000. Ideally, a program should be written so that all of the REM statements can be erased to leave the program fully operative. Stick to this rule and you may never see the undefined statement message.

RedIM'd Array

When a variable is dimensioned it should be given its values as close to the beginning of the program as possible. Never dimension a variable immediately before it's used because future modifications may cause the line to be processed a second time and the redimensioned error will occur.

To redimension an array within a program means that the CLR command has to be used first. This will unset all of the variables that have accumulated whether dimensioned or not.

Always remember that an array cannot be altered within a program simply by inserting a new DIM command.

Illegal Direct

Some commands can only be used within a program and not in direct mode. You can type and use PRINT A\$ but you cannot use INPUT A\$.

This rule applies to the GET statement as well as INPUT. The \$k versions (GET # and INPUT #) will not work in direct mode either.

Break

This is not so much an error as an information message. It only appears when a deliberate act occurs, such as pressing the RUN/STOP key or inserting a STOP statement within a program.

When the command appears during the execution of a program the message reads something like BREAK ERROR IN LINE 210. This is the line that was being executed when the break was made.

Can't Continue

After a break or STOP interruption, the program can usually be restarted with CONT. If a line is added after the break, or if the program hadn't even been RUN, the computer can't CONTINUE and tells you so.

If a syntax error has occurred, the CONT command will also generate this message.

Syntax

Last but not least, the most common error is denoted by this message. It is probably the first error message that any computer user will encounter and results from incorrectly keying in a command. Often the fault is a typing error such as PRINT or PRIT instead of PRINT but it can also appear if incorrect parameters are given along with a command.

One other cause occurs when a reserved word (Basic command) is embedded in a variable name. The temptation to use variables like MONEY, DIFFERENCE and TOTAL should be resisted because they hide keywords ON, IF and TO which would make the computer read these as:

```
IF MONEY
DIFFERENCE
and
TO TAL
```

This makes absolute nonsense as far as the computer's operating system is concerned or, in other words, the syntax is in error.

One common example of this kind of error is when RETURN is pressed on the READY prompt. The computer sees this as READ Y and usually an OUT OF DATA ERROR message will appear. If there is a program in memory with DATA statements in it and it hasn't yet been used, the READY will attempt to read in the first value. String DATA will generate a TYPE MISMATCH ERROR but numeric DATA will cause a SYNTAX ERROR because of the full stop after READY.

Over the past few months, First Steps has covered all of the errors to be found on the C64 and earlier Commodore machines but now the Plus/4, C16 and C128 have added several new errors and the next article in this series will be looking at these in detail.

Ingrid's Back

Level 9 is something of a curm's egg amongst software companies - good in parts. When the home micro boom started, their early adventures were head-and-shoulders above anything else produced in this country. Sominally, they had the entire market in adventure games sewn up, but the promise never really materialised. The inclusion of graphics added nothing to their games, with decidedly low-resolution pictures that frequently had nothing to do with the location being described.

Something new was required, and the introduction of 16 bit machines soon led to the pepping up of the graphics. They were also working on the development of character interaction. The idea was that instead of just solving puzzles, the player also had to enlist the help of some of the people to be found wandering round the story.

The first two games using this system, *Knight One* and *George Ringer*, didn't really come off. Whether this was due to a poor storyline or unfamiliarity with the system is hard to tell, but reaction was extremely mixed.

Ingrid's Back features the heroine of *George Ringer* in a new storyline. Returning back to her home town of Little Mooring, Ingrid finds that the town's inhabitants are under threat of eviction from one Jasper Quickback, who is determined to build a marina. This doesn't particularly concern the townsfolk, as they are under the impression that the eviction order is a very push party invitation.

One of the main problems Ingrid faces is that most of the gammas have experienced her attempts to help them before, and so are somewhat wary of her ministrations. In part one of the three load games, Ingrid must get enough signatures on a petition to protest about the development.

A strangeroller threatens to knock down a farm in the second part, with part of the solution being highly reminiscent of the opening to *Woolly-Billys Guide to the Galaxy*, and something that should very much be taken lying down. Finally, the evil Jasper must be dealt with in order to ensure that he gets his comeuppance.

The parser is Level 9's usual one, which means very good indeed. Complex commands are dealt with easily, although there's no real need to use them. Likewise, there are no obscure vocabulary terms to be used. Useful commands include 'go to somewhere', 'follow someone, find someone and wait for someone. There are only colour pictures on the disk version, and not every location is illustrated, but those that are are of a reasonable quality.

All the gammas have personalities of their own, and it's fun just watching them getting on with their own lives. The one main character that you'll need to make use of is your ever-faithful dog Flappy.



Ingrid's Back is a nice, gentle game, both in story and puzzles. Certainly, it is Level 9's most humorous and indeed best game for some time. The trouble is, there's nothing to get really excited about. I can remember back in the early days of games such as *Dungeons Adventure*, really looking forward to loading the game in again and trying to discover something new. That feeling is sadly missing here. I can imagine my granny watching over my shoulder and not finding anything to complain about, and that I suspect is half the problem. Adventures should be thrilling, not Mills and Boon.

Tweezer:
File: *Ingrid's Back*. Supplier: Level 9, PO Box 38, Weston-Super-Mare, Avon, BS24 9JW. Tel: 0854-214420. Price: £14.95 (cash forward).

Driving Ambition

Buying a disk drive is the first step, but where can it all lead?

By Kerry Fowler

As an American Commodore owner about a database and most of them won't know what you're talking about. They may have seen one but few actually use them. In the U.S.A. disk drives rule supreme.

Before the appearance of cheaper drives over here, cassette were the normal storage medium and Indian was life. Although cassettes still account for the majority of storage devices, drives are much more common now and you probably know someone who owns one even if you haven't got one yourself.

Commodore 1500-series drives cost a small fortune even when compared to the price tag on disk drives for the Amiga. The reason for this is that the drive is an intelligent device, containing its own 6802 processor. The advantage of this is that the drive doesn't use up very much of the host computer's memory with a massive disk operating system (DOS). Processors and their related chips are expensive, and buying a drive is almost identical to buying a computer from an electronic viewpoint, hence the expense.

It all started with the old PET computers and their 4040 drives. These were often supplied as twin drive units housed in a casing that would occupy an area about four times the size of the 1500 series drives. These drives were used as the models for the 1540 disk drive which was devised to accompany the VIC20 computer. You may have wondered why the system for disk communications contains a value for a drive number even though it's always zero. This is a throwback to the 4040 days, because both drives had the same device number (0) but one drive was set as drive D and the other was drive I.

This is not the only hangover from the old days. Examine the User's Manual and you'll find an entry for the DUPLICATE command which

says that this is not for single drives. This does not mean that it will work if you buy a second drive because it requires a drive number of one rather than a device number other than eight. Similarly, the copy command will only copy a file under a different name onto the same disk. On the 4040, this was not the case.

Some of the impacted features are not so amusing. The well publicised save-and-replace bug which makes this command a dodgy one to use has most people using the SCRATCH command to remove a file and a normal SAVE to restore the updated version of the erased file.

The 1540 gave way to the faster (believe it or not) 1541 and 1541C for the C64, Plus4 and C16 which, in turn, gave way to the 1570 and 1571 for the C128. All the drives are compatible and can be used with any of the machines but the 1541 will not handle differently formatted disks, such as CP/M or MS-DOS, for the C128 and the machines derived for the 1541 can't easily access the C128 drive's advanced features. Some of the older, software-based file loaders can't operate on the 1570/1 and the best advice is to buy the drive designed for your particular machine, no matter what a fast-talking salesman may be trying to lob you off with.

The Plus4 and C16 computers had their own drive which was rather revolutionary. Prior to the appearance of the 1581, Commodore had settled for serial communications for both drives and printers. This means that all information is sent down a single wire as a long stream of bits rather than bytes. The 1581 used parallel communications which meant that data was taken in through the user port a whole byte at a time. Simple mathematics shows that this improves data transmission eightfold and the actual improvement was even greater than this.

The 1581 didn't catch on and Commodore reverted to serial drives.



Action Display

for the C128, but this was not an end to their experiments. Recently, the 1581 has appeared which combines the capacity of a 3.5 inch disk with faster disk access. It's an excellent drive but failed to be the preserve of those who keep large databases or who wish to standardise their new 16-bit machine with their trusty old 8-bit.

Add to these drives the two indices,



Warp Speed

Orion and Blue Chip, and you have the full range.

The Range Loners

The problem with such choice is which utilities work with which drives. Left to their own devices, the lone computer users can fall foul of the wide choice of add-ons which are totally unsuited to their systems.

Plus and C16 owners are treated like hi-tech lepers as far as the hardware companies are concerned. Any benefits are spin-offs of the drive

compatibility with the C64 but cartridges, DOS boards and alignment kits are just three things that they can rarely dream about. Most of the utilities are aimed at the C64 and 1541 combination.

The Expert



C128 users can take heart in that its natural compatibility makes the



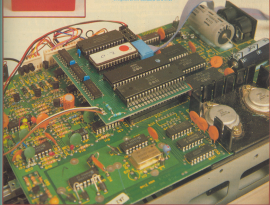
The Plus Cartridge

majority of the C64 range available to them, but only in C64 emulation. The indie drives are very good, compact and relatively cheap but incompatible with systems such as *Dolphin DOS*, though they often produce good

Area Frame



Dolphin DOS installed in a C128



results with cartridges. Don't believe some of the literature that claims that these drives are faster than the 1541. If there is any difference at all, it is minimal and failed to show up in the tests we performed several months ago.

There are four main cartridges for the C64 and only one for the C128 in its natural state.

The *Expert*, *Proze Frame*, *Final Cartridge* and *Action Replay* form the C64 line up (all are compatible with the C128 and 64 mode). As far as speed is concerned, the *Action Replay Professional IV's* *Warp 25* and the *Expert's* *Rocket* system provide the fastest loaders possible. *Action Replay* has a slight edge because it is easier to use, but the *Expert* would be a better overall bargain if Trilogic would release the secret of programming its RAM chip. *Proze Machine's* *Laser* system runs at about half of this speed and has fewer utilities on offer. The *Final Cartridge* is bristling with facilities, but its fastload is slightly slower than *Laser*. I know of several people who swear by this cartridge but personally I'd rather swear at it.

For my money, the *Action Replay* cartridge wins hands down both on the grounds of speed and facilities. This is especially true for drive owners because the monitor can be used to write and execute programs for wedging into the disk drive's operating system.

Financial Systems Software market the *Warp Speed* cartridge for the C128. This is suitable for use in the C64 mode or C128 mode. Although it works with a straight C64 machine, I can't really recommend it because, despite its go-faster name, its speed loader is pathetic even when compared to the *Final Cartridge*. It's great advantage is that it is the only C128 specific cartridge and sports a very impressive monitor which has a drive interrogation function similar to the *Action Replay* together with an impressive range of useful-type commands.

Porpoise Built?

Although there were three hardware fast loaders available at one time, Data1 and Trilogic seem to have pulled out of the stakes and *Dolphin DOS* from Evesham Micros has a clear field. At twice the price of a cartridge, you may be wondering why I mention *Dolphin* at all. It is no faster than *Warp 25* and its monitor is rudimentary when compared to

Action Replay. Its one main advantage is that it doesn't use a special disk storage format which is the secret of *Warp 25* and *Rocket*. Instead, it uses parallel loading to increase its speed. This means that it will load ordinary programs and the majority of commercial programs at lightning speeds.

The one disadvantage of *Dolphin* is that it relies on a chip change in the computer and the disk drive. The drive modification is fairly easy to do but the replacement ROM for the computer can be awkward. This is not a job for the rank amateur because most ROMs are securely soldered into the circuit board. When I installed my *Dolphin DOS*, it meant desoldering the original ROM, fiddling about soldering in a chip socket and after that it was plain sailing. The risk is obvious, one small slip of the soldering iron and you can wave goodbye to your 64.

The C128 modification only works in C64 mode with a 1541 but, with earlier models, installation is simple because the ROM chip is already housed in a socket. Simply lever out the old ROM and bring in the new.

One big advantage of *Dolphin* is that it can be modified to handle two disk drives, opening up the possibility of superfast disk backups. It's expensive but very highly recommended as the fastest standard disk system on the market. Even the best cartridge can only load standard files at half the speed of *Dolphin DOS*. On the other hand, owners of indie drives can forget about this system because it's devised solely for the 1541.

A cheaper solution to disk backups lies in the *Fast Hardfile* disk from Data1. This carries a variety of copies and nibblers but one facility which is particularly spectacular is the two drive auto disk copiers. These wedge a program into the drives which takes advantage of their intelligent chips. Once the program is loaded from the C64, the drives can be disconnected from the computer and left to do their own thing. The speed is amazing and takes less time than normal disk formatting. Once one disk has been copied, the drives will carry on copying with new master and destination disks, very useful.

Care Ware

Like cassette heads, the drive head can get clogged up with oxide particles from the recording surface. This is

especially true if you use cheaper disks. Various companies produce cleaning disks which will remove the oxides but the problem is that these products often carry instructions for use with PCs. To use them with a Commodore computer, place the disk in the drive and close the flap. Next, execute a disk formatting command and the drive will whir round happily, cleaning it as it goes.

Most proprietary cleaners will remove dirty finger marks from the drive's plastic casing, but be careful not to choose a cleaner which contains solvents that are unsuitable for use on plastic. Aerosols should also be avoided because the spray could get inside the drive and damage the electronics as even one of your precious disks.

No matter how careful you are with your drive, the time will come when it becomes unreliable and starts issuing spurious error messages. The cause is generally a speed variation due to wear but this is quite simple to correct for yourself. To check the speed, you'll need a disk alignment kit. The best one that I've found is the *Drive Doctor* from Trilogic. Compared to the alternatives, it is cheap but thorough and has the advantage that the software is supplied on tape rather than disk. The reason for this appears to be an overabundance on the part of the manufacturers brings us back to the widespread use of disk drives in the States. All the alignment disks apart from Trilogic's are produced in the USA, where it is a fairly safe bet that a blind man will have a working drive which can be used to load the software. In Britain, this is not so likely and Trilogic are to be commended for using their common sense. *Drive Doctor* runs speed, hysteresis, alignment, stop position and movement tests on the drive. The alignment test should only be used as a last resort. Investigate the possibilities of dirty or broken mechanical parts or electronically based speed problems first. If these fail to show up any fault then you may as well try re-alignment because, even if you can't actually fix the drive at the end of the day, you would have had to send it away for re-aligning anyway!

The small but beautifully formatted manual that is provided with the kit also carries a warning about quiet stops. These are little wear clips that replace the heavier metal

steps which are supplied with the drive. As far as I'm concerned they are simply another application for a paperclip. Quiet stops are purely cosmetic devices which stop the drive from making that loud hammering noise when formatting a disk. The stop is a hard stop for one good reason, the drive isn't so that it can orientate itself with relation to the disk. If the stop gives slightly, and a quiet stop certainly does, the head will lose track of its real position, formatting will be off line and the odd error message will be returned.

While I'm on the subject of drive warnings, fast formatters are also pretty evil devices. When formatting starts, even the most solid of hard stops is subjected to violent vibrations as the disk becomes off at its high speed. This can even fracture the resin that is used to hold the stop screw in place. The result is the possibility of the screw slackening and the stop moving which is a situation even worse than that caused by quiet stops, though somewhat less likely. I once switched off Dolphin DOS when I format a disk three days because I have found that

occasionally a disk is incorrectly formatted. The problem with this fault is that it doesn't show up until I start to use the disk.

Bits and Bobs

Disk doubling may be classed as another bad practice but so far I've had no trouble. This is the rather logical act of cutting a write enable notch in the opposite side of the disk so that it can be turned over and used upside down. This means that the reverse side of the disk can be used to store information. Referred to as flippers, these disks have twice the storage space of the unmodified disk.

There are two potential problems that can arise with a doubled disk. First, the disk may be classified as a single-sided disk because it has failed the quality test as its reverse surface. Secondly, the normally unused side of the disk runs on a felt pad which causes friction and can rub off the oxide coating. With a doubled disk this means vital sectors may wear thin and eventually end up in a heap on the pad! If you go in for disk doubling, check the felt pad every couple of

months to make sure that oxides are not building up.

Disk Notchers can be purchased from DataL and quite a few computer shops but, if you're not too bothered about the disks appearance, a hole punch such as those used for making holes in paper for clip file storage can be pressed into service. It's all a case of accurate positioning. Cut too shallow and you'll not remove enough of the sleeve, cut too deep and you'll perforate the disk itself.

Finally, just a short mention about disk boxes. Don't be seduced by the latest compact box which folds out like a cassette case - it may be too easy to trap your disks when you close the box again. I favour the boxes which have a lift-up lid, they generally hold more disks and they offer better value for money because they're less likely to get broken.

Look after your drive and it will last for years. Despite the heavy use and ill-treatment my drives get, they have lasted for five years. That doesn't mean that I've had no problems with them, otherwise why else would the editor have asked me to write this?

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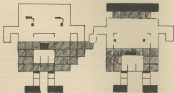
For the final article in this series I thought that it would be best to leave everyone with something to think about. Basically, I'm dealing with sprites in the border. Commodore said it couldn't be done but many programmers, from Jeff Miner and Tony Crowther downwards (or upwards for that matter), have proved that it is not only possible but also practical.

Type in the first listing and run it with SYS 49632 to see what sprites in the border look like. Isn't it wonderful? Well, one thing I'd like to say is that there aren't any sprites in the border. No, I know you can see them but they're not actually on the border!

Examine the disassembly and we can see what's happening. The screen is split at raster 32 and 89. What's

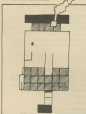
Sprites over the border can be easier than you think

By Eric Doyle.



May I Interrupt?

happening is that the screen colour changes between position 89 (near the bottom of the screen) and position 32 near the top. These more or less coincide with the border position and the program further continues the viewer by changing the screen from dark blue to pale blue. Change location \$2009 to seven and you can see the true situation.



Now we have a screen which has a screen colour and two different border colours. We've extended the screen interrupt to colour over the border. This is now inaccessible screen space. There are no memory locations

for the hand at the top and bottom of the screen. As you can see, inaccessible is not strictly true because the sprites can access this area and, thanks to the border no longer existing, they can be seen.

If you examine the programming of the sprites you'll see that there is nothing particularly clever going on. The only special treatment is that some of the sprite location values aren't normally accessed for visible sprites.

The positioning of the raster interrupts is crucial but you might like to alter them to see what happens. The values are stored at \$C060 and \$C064 so with the interrupt routine the values can be changed from basic with POKE 49135, XXX and POKE 49136, XXX. Try values of 552 (DFC) and 247 (SFT) respectively to start with.

Border sprites are really just a whimsical use of the interrupt facilities but they show all of the basic elements.

First of all, the interrupt must be set up after suspending the IRQ system. This is done with the SEI command. Now the parameters can be changed without fear of a crash resulting. Next the locations \$D00D and \$D00D must be set correctly. The start location of the routine which is called during each IRQ should then be stored in locations \$0314 and \$0315 in low byte/high byte order.

Now a decision has to be made. Will the interrupt be linked to the raster scan or just happen whenever it can? If raster linked the point must be set in location \$D012. Such applications would be for screen splitting, scrolling, border sprites, more than eight screen sprites at a time or for occasions when the screen is disrupted by a slightly longer interrupt.

Location \$D01A should now be set, then the interrupts can be recalled by CLI and the routine left via a standard RTS.

Apart from the essential program within the interrupting routine certain other elements should be included. Most importantly, location \$D019 must contain a value of one. This can be done at any point within the routine. I normally include it as part of the exit routine.

Another consideration is whether a keyscan is needed. If it is, the final command should be JMP SEAL1. If the scan is not required the registers must be reset.

When an interrupt occurs, the current accumulator, X register and Y register values are pushed onto the stack. Any routine must clear all of its own parameters off the stack even before the JMP SEAL1 command. If this is not done, there is a danger that the computer will crash when the interrupt is over.

To reset the registers use this routine to clear the interrupt:

```
PLA
TAY
PLA
TAX
PLA
RTI
```

Sometimes it is necessary to have two or more alternating interrupts. During each interrupt routine locations \$0004 and \$0005 must be changed. It's not necessary to turn off the interrupts this time and you'd be ill-advised to do so because the routine itself is the interrupt. Simply poke the low and high bytes into the correct locations. If the two routines form a double split for screen manipulations, the raster value at location \$0813 will also have to be changed.

The best way to come to terms with interrupts is by experimentation. Things won't always go your way but you'll soon become proficient at knobbing up routines that will stun and amaze your friends.

In the interests of clarity, I've not used the most efficient routines possible so that could be a starting



point for learning. Go through your back issues of May 1 Interrupt and see if you can compress the routines to save memory by using an interrupt counter. This is an alternative to resetting the locations at \$0014. A byte of memory is held aside to act as a counter. If your example has two alternating interrupts, the location, or flag, is set to zero initially. Loading this into the accumulator will set the zero flag in the status register so a simple BEQ command will execute the correct routine. In this branch routine, the flag will be set to a value of 1 and the next time the interrupt is executed it will skip the BEQ branch and execute the second routine which follows on.

The series has, I hope, given food for thought and guidance to those whose curiosity outstripped their technical knowledge.

In future issues of the magazine you'll find many other examples of interrupt-driven software which you should now be able to understand more easily. Well it's time to pull the plug and execute a final RTI to mark the end of the series.

FDump

Dumping your whole screen to a printer can be very useful. It's even more handy when the dump is linked to the F1 function key.

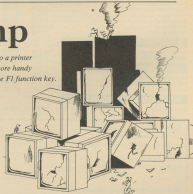
FDump is a very simple idea. It's a small routine that sits in memory, from 49152 onwards, and will send a whole text screen to the printer every time you hit the F1 key.

The program is initially activated by entering SYS 49156. If, however, you want to use FDump from inside a Basic program, or in direct mode, SYS 49191 will do the trick.

Getting it in

The program is a small machine code routine in the form of a Basic loader. For advice typing it in, see our Listings page.

By N J Burton



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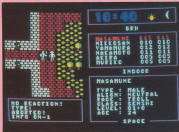
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played *Dungeons and Dragons*, these correspond roughly to clerics, druids, magic user and illusionist-type spells. Unfortunately, the name of any spell to be cast has to be typed in full, so that means more Japanese to learn. Why a system of mnemonics or a menu couldn't be used I don't know but, the result is decidedly user-unfriendly.

All commands are entered as single keystroke entries via the keyboard, more or less a direct crib from the *Ultima* series of games (in fact the whole game has a decided *Ultima* feel to it, right down to the graphics). Not all of these are easy on the memory though, and I kept typing 'Q' to open something and finding myself in the speech menu (Q=orate). Having said that, once you do decide to talk to someone, you have several options available to you. 'Chat' starts a general conversation, whereas 'talk' attempts to elicit information, although you usually have to pay for this. 'Inquire' allows you to ask about a specific subject. All trading is also done via the 'create' menu.

The game is set in the land of Loam, and there's plenty for you to explore - 16 different continents, dungeons



gales, caves, ruins, pyramids, ruins, towns, villages and palaces all protected by 128 different kinds of monster.

Darklord is not in the top flight of role-playing games, but should appeal to anyone with an interest in

things oriental. My overall feeling though is that it is a poor man's *Ultima* - with Japanese subtitled. **G.R.H.**

Touchline:

Title: *Darklord*. **Supplier:** Electronic Arts. **Price:** £14.95.



dangers, including muggers, more corrupt cops, and the infamous New York traffic. Now you're beginning to comprehend the scope of your arch enemy's operation, and realise that you must stop him at all costs. There are six levels - that are loaded in separately once you've completed the previous one - which will take you down into the sewers, into Kanitaki's opium factory, through an office block and onto a final confrontation with the evil Shogun.

If *Last Ninja* had one fault, it was the fact that you could take as long as you liked over each screen in the game, which slowed down the action considerably. *Last Ninja II* solves this problem by allowing your defeated foes to recover from the beating you gave them, and rise up to challenge you again if you hang around too long. With this major drawback removed, *Last Ninja II* is destined to repeat the success of its predecessor and go straight to the top of the charts, but only time will tell whether it's strong

enough to fight off the challenge of games such as *Thunderbolt*, *Operation Wolf* and *Asterix*.

The game is sold in a special edition format with an instruction book, a 3D map of little value, a rubber sharken throwing star to worry those who worry about kids having such things, and a black cotton Ninja mask that's too small to fit me. Unfortunately, this adds to the price but increases the perceived value.

As before, the key to the game is to perfect the kung-fu armed and unarmed jorjick moves, so that you can defeat your foes without incurring too much damage, and concentrate on solving the games puzzles that will lead you to Kanitaki and the end of a challenging mission. **T.H.**

Touchline:

Title: *Last Ninja II*. **Supplier:** Synes J (*Shogunryu*). **Male Name:** *Mance*. **Form Name:** *Handing*. **BEPS:** 8002 **JN**. **Tel:** 01-451 1181 **Price:** £11.99 (tax).

The Beginner's Guide to the Commodore Disk Drives

By Allen Webb

To many of you, the acquisition of a disk drive promises an end to the tedious and bother associated with tape. On the whole, I think that the drives deliver most of what they promise. There are however three major drawbacks:

* Since the serial port is used, the drives are a little slow.



* A full DOS is not supplied.

* The manual is up to Commodore's usual appalling standards.

Fear not - this article will give you the introduction the manual fails to deliver.

First, some general points on Commodore's approach to disk drives. One point worth remembering is that most Commodore disk drives respond to the same system of commands. If, like me, you cut your teeth on the PETs, this means that changing to a 64/124 combination is simple and painless. The main exception is the 1571, which is a double-sided drive. Unlike many drives, the CBM disk drive is self-contained - it has its own CPU, RAM and ROM routines. This means that you can often leave the drive to perform a task while you continue to hash at the computer. Some copy packages, such as *Fast Master*, use this to allow two drives to work together without the computer! Similarly, some software uses the disk's routines and RAM to ensure copy protection.

Let's look at what a floppy disk is. If you look at one you will see that it is a square rigid envelope containing a brown disk. There is an oval window on each side and a small circular hole by the central opening. A notch is cut on one side of the envelope. The two windows are used by the drive to read and write data to the disk. The two small holes are called 'index holes'. The notch is the write protect - if it is covered you cannot write to the disk. The disk is inserted with the label opposite and to the rear.

On the 1541 and 1571 disk drives only one side of the drive is used to record data. Disks are sold as either single or double-sided. On the whole they are the same beast. When disks are tested during production, those disks which have both sides of the required standard are sold as double-sided. If only one side is acceptable, they are sold as single-sided. As a consequence, you can generally see the flip side of the disk by simply turning it over, but you must accept that it may not be as reliable as the correct side. In addition disks contain a lining which collects dust off the magnetic medium. If you turn the disk over, this dust may be ejected into the drive mechanism causing problems. There are mixed views on the seriousness of this aspect, and some software does

come on both sides of a disk. At the end of the day you must make the choice.

The disk is subdivided into 35 concentric tracks - a bit like a record I suppose. These tracks are subdivided into sectors. Since the lengths of the tracks vary depending on their position on the disk, the number of sectors per track also varies (from 16 to 28). When you get a new disk, the medium is quite random and useless for storage. Before you can use the disk you must Format it. This action lays down the track and sector pattern as a sequence of magnetic information. As part of the formatting process the system allocates Track 18 as the Block Availability Map (BAM). The BAM keeps track of where files are stored on the disk and the information needed to create the directory. But that's enough technical stuff - let's get on to using the drive.

In order to use the drive you need a disk operating system (DOS). The DOS provides the means by which you can copy, delete, rename files and get the directory. The main drawback with the CBM systems is that on the whole, no simple means of sending DOS commands is provided. There are, however, add-on packages which give easy access to DOS commands (more on them later).

You will note that the default drive number of the disk drive is 8 (you can change it but it involves some surgery under the drive's lid). In the old double drives, the individual drives were assigned 0 and 1 to allow you to differentiate between them. Nowadays, the single drive is assigned an identifier of 0. You can append this identifier to any DOS command.

The prime piece of information available is the directory. This is LOADed as a simple BASIC-type file which is then LISTed. This is done by using:

```
LOAD"8":S
```

There is a draw-back to this method of getting a directory. Since the directory is loaded as a BASIC type file, it will overwrite any BASIC program already in the machine. The only way around this problem is to use a machine code routine to display the directory direct to the screen.

Figure 1 shows an example of a directory.

Figure 1

0	"MYDISK"	80 2A
26	"PROGRAM 1"	PRG
53	"FILE"	SEQ
611	BLOCKS FREE	

The top line tells you about the disk's name. The zero on the extreme left represents the drive number. Next comes the disk name followed by the two character identifier. The 2A represents the version of DOS used. The files on the disk are listed below the header line. The left hand number represents the size of the file in blocks (one block is 256 bytes long so you can easily work out how big a file is). Next comes the file name and lastly the file type. There are several different types of file. The most commonly encountered types are:

* PRG - This is assigned to a BASIC program.

* SEQ - This is a sequential file.

* REL - This is a relative file.

The BLOCKS FREE message is self-explanatory. On an empty disk you have 644 blocks (about 700K) free.

The SAVE, LOAD and VERIFY commands operate exactly as with the cassette drive, except that you use a device number of 8 or 9 (as mentioned earlier). Similarly, a secondary device number is used to force a LOAD to a specific address, ie:

```
LOAD"MYFILE",81
```

There is also a REPLACE and SAVE option. This has the syntax:

```
SAVE " 0:MYFILE"
```

Normally if you try to SAVE a file to disk with the same name as a file already on the disk you will get an error. The REPLACE and SAVE option overcomes this problem and over-writes the file. It has been said, however, that this routine might have a bug in it which leads to the joining up of files on the disk. It is believed that this occurs when the disk is getting full and there is insufficient space for the new file. The bug is certainly recognised on the early DOS1 but it is uncertain whether later versions have it. The bug is fairly innocuous and its effects may not become immediately obvious. I never see the

REPLACE and SAVE option. I either SAVE files as a sequence of versions (eg SOURCE.1, SOURCE.2, etc) with periodic weeding of the oldest versions or delete the previous version before saving the new. This approach has never given me any problems.

The main route to the disk drive is by opening a command channel and then sending the command down it. This channel (number 15) can be opened with:

```
OPEN 15,15
```

This is followed by the DOS command in quotation marks.

Let us consider the format (NEW) command. When you format the disk you must supply a disk name and a two character identifier. Imagine that you want to format a disk with the name "WOMBAT" and the identifier 99. The format command then has the syntax:

```
OPEN 15,15,"NO WOMBAT,99"  
CLOSE 15
```

If you wish to reformat a previously formatted disk you can omit the identifier. In this case, the syntax would be:

```
OPEN 15,15,"NO;WOMBAT"  
CLOSE 15
```

It is a wise precaution not to use the same name/identifier on more than one disk. When you use a disk the disk drive reads the directory and the RAM. If you replace the disk with another with the same name and identifier, the disk drive will become confused and not realize that the disk has been changed. This can cause serious problems. Once you have formatted the disk you can proceed to SAVE and LOAD programs.

Once you have files on a disk, you will want to manipulate them. DOS offers a number of handy commands to help you.

Initiate

This command has a number of uses. It can be used to force the disk drive to read the details of a disk. It also resets the read/write head to the directory track. This latter feature is useful if a piece of software has left the head in an "illegal" position. The syntax of the command is:

```
OPEN 15,15,"I"
```

Scratch

This command deletes the specified file. It has the syntax:

```
OPEN 15,15,"SO-FILENAME"
```

Rename

This renames the specified file:

```
OPEN 15,15,"RO:NEW  
NAME=OLD NAME"
```

Here the file called "OLD NAME" is renamed to "NEW NAME".

Validate

If you have performed a number of actions creating and deleting files the operating system can have a problem redefining disk space and thereby leave you with less storage space than normally possible. Validate will recover this space.

```
OPEN 15,15,"V"
```

Copy

This duplicates a specified file on the drive and has the syntax:

```
OPEN 15,15,"COPY=ORIGINAL"
```

The file "ORIGINAL" is copied under the name "COPY" on the same disk. This command is interesting in that it operates independently of the computer. If you try it you will notice that control is immediately returned to the computer and the disk drive quietly clears or until the copy is made.

You will have noticed that the disk drive has a small light on its front. This light glows red when the drive is working. If an error such as a missing file or disk error is encountered, this light flashes. Clearly you may want to know what has caused the error. Some errors, such as trying to LOAD a non-existent file are obvious, since the computer will tell you it can't find the file. Others are not so obvious. The answer is to use the following lines as a stand-alone program or as part of a larger program:

```
10 OPEN 15,15  
INPUT 15,EN,EMS,ET,ES  
CLOSE 15  
20 PRINT EN,EMS,ET,ES
```

The variables have the following meanings:

EN - this is the number of the error (look in the back of your drive manual for details).

EMS - this tells you what the error is.

ET - this tells you on which track the error occurred.

ES - this tells you on which sector the error occurred.

The latter two values are only of use if an error has been detected in the disk contents or when a defect occurs in the disk. You will notice that once the program has RUN the light on the drive stops flashing. As, an example, if you try to LOAD a file when there is no disk in the drive and then RUN the above program you will get the output:

```
34 DRIVE NOT READY 00
```

If the drive tries to read a track with an error present, it can become confused and the drive will attempt to position the head at the first track. This is attempted several times, leading to the head hammering against the end stop. Some software uses deliberately created disk errors as copy protection leading to this "hammering" every time you use the drive. This can knock the drive head out of alignment leading to read/write problems. The following simple program should disable the "hammering" mechanism (until you turn the drive off):

```
10 OPEN 15,15  
20 PRINT 15,"M-W":CHR(100)  
CHR(0) CHR(1) CHR(133)  
30 CLOSE 15
```

There are products available which help you to get over the slow speed of the drives and the fiddly disk operating system. You can find several advertisements for these in Your Commodore but the ones worth looking at are Arison Supply (Distri), the Expert Cartridge (Inlogic) and The Final Cartridge (Evidham Major). The April issue of Your Commodore contained a review of the Expert and Final cartridges.

I hope this introduction to using the drive will be of value. I am aware that I haven't touched on using data files, but this in itself is a fairly big subject. I intend to give an introduction to this in a future item - so watch this space!

A Flow of Ideas

When you're all excited about starting your next program, pre-planning may seem dull, but it can save time in the long-run.

By Norman Doyle

Flowcharting had always been anathema to me. I'd read so many hokey-thin-thin articles about how flowcharts are the only way to produce well-structured programs, that it left me feeling inadequate. I am a programmer, but charts left me cold - only when I analyzed my methods did I realize that I'd been doing informal flowcharting for years without talking it.

What happens when you sit down to write a program? First of all you decide what the program is going to do. Then, if you're anything like me, the next thought is whether there's a program that can be modified somewhere in the software collection, or if not, are there any routines that can be "borrowed" piecemeal?

You may not realize it, but already you've stepped onto the slippery slope to flowcharting. Basically, what's happening is that you're breaking down the job into smaller parts. Take the archetypal Space Invader program, and imagine that you've cut down to write it. First you have to analyze what it does.

Immediately you consider the program, certain elements leap out at you. Let's work out how a simple

decimal to hexadecimal converter could be written. In making this decision, we've started planning, because the aim of the project has already defined the start and end points of the project.

decimal input



hexadecimal output

To continue, we must now define more clearly what the end result will contain.

For most purposes, hexadecimal numbers are particularly useful when high and low byte values of a number have to be calculated. So why not make this routine convert a number to hex, and print out the hex conversion plus the high and low bytes in hex and decimal.

decimal input



print out
hexadecimal number

high byte dec & hex
low byte dec & hex

Now we know where we're going, we can now consider the program in greater detail.

A number has to be entered for the computer to work on. Rather than converting to hex and then back again, it would seem logical to split the high and low byte at this point. Next, the hex number has to be calculated, and then all of the information can be printed out.

decimal input



split high and low byte



convert to hex values

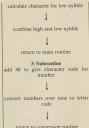


print out
hexadecimal number
high byte dec & hex
low byte dec & hex

The program is now taking a very definite shape, but the hex calculation is still a little vague. From the rough diagram, it's clear that at this point there are three values floating around: the decimal number and the high and low bytes in decimal. This means that two of the numbers are less than 255, and can be treated in the same way for conversion to hex. The two numbers can then simply be concatenated to yield the full hexadecimal number. This would give all the values necessary for the final printing section.

Since it's necessary to put both the high byte and the low byte through the same process, a subroutine would remove the need for repeating the same program lines twice. A breakdown of this routine is needed.

Each number has to be split further into a high and low byte. The value of each is then converted into character ready for recombining in the final hex conversion. Once again there's a repeated action and, therefore, another subroutine.



This is a fairly simple example of an informal flowchart, and in this case it is probably quite sufficient. The proof of the effectiveness of the flowchart comes when the program is written.

Decimal input is simply an INPUT command with a suitable text message:

```
10 INPUT "WHAT IS THE DECIMAL VALUE?"ND
```

A simple mathematical calculation splits the high and low bytes:

```
20 HI = INT( NO / 256 ) LO = NO - HI * 256
```

Calculating the high byte and the low byte in hex involves the two interactive subroutines. In the case of the call from the main routine, variables are swapped before calling and after returning from the routine.

```
30 TEMP = HI:GOSUB 80:HI = LO
40 TEMP = LO:GOSUB 100:LO = TEMP
```

This printing out of the information is simply a case of firing the correct variables with suitable text:

```
50 PRINT NO: " = $", HI; LO: PRINT "HI-BYTE = "HI, "S", HI:PRINT "LO-BYTE = "LO, "S", LO: END
```

Applying the subroutines, the bytes have to be calculated and assigned to suitable variables. The values obtained are then converted to character values, and then the characters are stored as a string, which is built up into the hexadecimal byte value before handing back to the main routine.

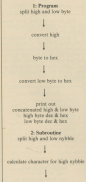
```
100 T=TEMP AND 240: H=CHR$(T)
150 TEMPS = CHR$(T)
130 T=TEMP AND 15:GOSUB 130:TEMPS = TEMPS + CHR$(T)
140 RETURN
```

The character value calculation which forms the second subroutine merely adds 48 to the numerical value of the byte. This means that the character value for one to nine is given directly, but the alphabetical values from A to F (values 58 to 67) would actually produce various punctuation symbols if CHR\$() was to be applied at this point. These values need to be raised to render values of 65 to 70 which will give CHR\$() characters A to F.

```
150 T=T+48: IF T > 57 THEN T=T-7
160 RETURN
```

If the program is tested it will actually work. If a problem did arise, it would be easier to locate the root of the problem thanks to the pre-programming planning stage.

Decimal Input



```

PROGRAM1.DEC TO HEX CONVERT
10 10 INPUT "NUMBER", N0
20 HI = INT( NO / 256 ) LO = NO - HI * 256
30 TEMP = HI:GOSUB 100:HI = LO
40 TEMP = LO:GOSUB 130:LO = TEMP
50 PRINT NO: " = $", HI; LO: PRINT "HI-BYTE = "HI, "S", HI:PRINT "LO-BYTE = "LO, "S", LO: END
60 100 T=TEMP AND 240: H=CHR$(T)
150 TEMPS = CHR$(T)
130 T=TEMP AND 15:GOSUB 130:TEMPS = TEMPS + CHR$(T)
140 RETURN
70 150 T=T+48: IF T > 57 THEN T=T-7
160 RETURN
80 200 END
90 100 TEMPS = ""
100 100 TEMPS = ""
110 100 TEMPS = ""
120 100 TEMPS = ""
130 100 TEMPS = ""
140 100 TEMPS = ""
150 100 TEMPS = ""
160 100 TEMPS = ""
170 100 TEMPS = ""
180 100 TEMPS = ""
190 100 TEMPS = ""
200 100 TEMPS = ""
210 100 TEMPS = ""
220 100 TEMPS = ""
230 100 TEMPS = ""
240 100 TEMPS = ""
250 100 TEMPS = ""
260 100 TEMPS = ""
270 100 TEMPS = ""
280 100 TEMPS = ""
290 100 TEMPS = ""
300 100 TEMPS = ""
310 100 TEMPS = ""
320 100 TEMPS = ""
330 100 TEMPS = ""
340 100 TEMPS = ""
350 100 TEMPS = ""
360 100 TEMPS = ""
370 100 TEMPS = ""
380 100 TEMPS = ""
390 100 TEMPS = ""
400 100 TEMPS = ""
410 100 TEMPS = ""
420 100 TEMPS = ""
430 100 TEMPS = ""
440 100 TEMPS = ""
450 100 TEMPS = ""
460 100 TEMPS = ""
470 100 TEMPS = ""
480 100 TEMPS = ""
490 100 TEMPS = ""
500 100 TEMPS = ""
510 100 TEMPS = ""
520 100 TEMPS = ""
530 100 TEMPS = ""
540 100 TEMPS = ""
550 100 TEMPS = ""
560 100 TEMPS = ""
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580 100 TEMPS = ""
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680 100 TEMPS = ""
690 100 TEMPS = ""
700 100 TEMPS = ""
710 100 TEMPS = ""
720 100 TEMPS = ""
730 100 TEMPS = ""
740 100 TEMPS = ""
750 100 TEMPS = ""
760 100 TEMPS = ""
770 100 TEMPS = ""
780 100 TEMPS = ""
790 100 TEMPS = ""
800 100 TEMPS = ""
810 100 TEMPS = ""
820 100 TEMPS = ""
830 100 TEMPS = ""
840 100 TEMPS = ""
850 100 TEMPS = ""
860 100 TEMPS = ""
870 100 TEMPS = ""
880 100 TEMPS = ""
890 100 TEMPS = ""
900 100 TEMPS = ""
910 100 TEMPS = ""
920 100 TEMPS = ""
930 100 TEMPS = ""
940 100 TEMPS = ""
950 100 TEMPS = ""
960 100 TEMPS = ""
970 100 TEMPS = ""
980 100 TEMPS = ""
990 100 TEMPS = ""
1000 100 TEMPS = ""
  
```


Civil War

*Decisive Battles of the
American Civil War
Vol III*

The American Civil War has been covered more than any other period in history so far as wargames are concerned. There are two main reasons why this is so. The conflict marks the beginning of modern warfare as we know it, and secondly, it's the only real history wargame you've got, and most of the major wargame-producing companies just happen to come from the other side of the pond.

It must come as something of a shock then to the Americans to find their own civilised period being the subject of a wargame from an Australian company. Not only that, but as in the previous games in this series from the Strategic Studies Group, it's much better than anything else currently on the market.

The first (and last) volume in the Civil War series covers six different scenarios all covering towards the end of the war, in the states of the north - Wilderness, Gettysburg, Cold Harbor, Atlanta, Franklin and Nashville - and on the south side, then the campaigns involved - Lee, Grant, Hood and Sherman - certainly an Empire like wargame that's ranked volume, to say all pertinent to present the considerable volume of Great Britain, who were able to make much better use of the challenge to keep their armies supplied.

Should you grow weary of these six battles, then you can always try them at your will. Included in the package is the Wayne rules, allowing you to alter your own variables and you choose. There are green throughout the documentation as to what changes you might like to try, and there is a worked example showing you exactly how to go about it.

The history accompanying the game is first class, and gives a full indication of the care that has been taken with the program. The 46 page instruction booklet gives the historical background to the scenarios, as well as taking you through all the rules used in the game. Comments of this nature are included on scenario cards, together with a full colour map of the battle area. Finally, there are even some stock labels included for you to put on your models and campaign files.

These games are not the war that I would recommend to a beginner, but to an experienced player, they should provide many hours of enjoyment. The bulk of it is so good that because the rules require so little of what writing up thousands of pages, better movement, using a map, pictures as you want and with all the illustrations and for you. Wargames have been that it is good! — G.R.B.

Twaddle

Table Game: Decisive Battles of the American Civil War Volume III. Scepter. £19.95. 200 pp. Price £19.95.



Extending Basic

Learn how to develop your own extended Basic routines

By Burghard-Henry Lehmann

Commodore 64's Basic is about as inadequate as you can get. Many commands which other 8-bit home computers take for granted are missing, like CLS (clear the screen), AT (set print position to line *x*, column *y*), and GOTO variable, which allows you to define a line number as a variable — no mention but a few.

But worst of all, Commodore Basic does not support any of the advanced graphics and sound features of the C64. If you are an avid programmer in Basic, you might be forgiven for never having come across any of the more advanced features of your computer — unless, that is, you go into heavy poking and write lots of subroutines in machine code.

The purpose of this series of articles is to show you how you can setup an Commodore Basic in any way you like according to your personal needs. This is not yet another series of extended BASIC routines you just type in and use. Instead you should be encouraged to develop your own extended routines — the examples given are meant only as illustrations to help you develop your own ideas.

Since extended Basic routines have to be written in machine code, they'd be impractical otherwise; you'll need some grounding in assembly programming, as given in my recent *Four Commodore series: Diving Into the 6510*. In a way this series is a continuation of *Diving Into the 6510* because it should also teach you a lot more about assembly programming, especially about making use of the many ROM-routines of the C64.

Driving a Wedge

In order to make the C64 accept and execute your own extended commands, first you have to interrupt the normal flow of Basic at one point in the ROM. This is called "driving a wedge". A wedge is a routine that interrupts the normal flow of a ROM-

routine, and makes the computer jump to a routine written by you instead of the normal routine written in ROM.

But how can you drive a wedge if you can't write to ROM? The developers of the C64, who wanted their machine to be as flexible as possible, thought of this. The most important routines both in the Basic-ROM and the Kernal-ROM are accessed via vectors, and these vectors are in RAM, where they can be changed.

A vector points to the start address of a certain routine. Instead of jumping straight to the beginning of the routine, the computer gets the start address for the routine from the vector location (indirect addressing), and then jumps to that address.

The most important vectors of the C64 are at location 3000 to 303E. Since all these vectors are in RAM, they all can be changed! For example, location 3002 normally points at 3A4B3. This is the so-called "BASIC Warm Start", which is entered either after a direct command has been executed or a Basic line has been started into the Basic textfile.

It starts by waiting for the return key to be pressed. Then the line as the screen is entered into what is called the "input buffer". Next, if the line has no number, it is executed straight away as a direct Basic command or, if it has a line number, the line is entered into the Basic textfile. Then the computer jumps back to the warm start. But every time it goes via the indirect jump in locations 3A4B3, and this indirect jump uses the vector at 3002. If it hasn't been changed, the computer jumps to 3A4B3, the start of the routine. If it has been changed, the computer jumps to whatever routine the 3002 vector is pointing at.

You could therefore interrupt the normal Basic flow at this point. But since you want to introduce new Basic commands, there is a better point. We interrupt Basic just before a Basic

statement is executed by the computer. This is done via the vector at 3030 — normally this vector points at 3A704.

Executing a Basic command

The routine at 3A704 starts with the Basic line to be executed being stored in the input buffer (3020-303F). Furthermore, all Basic commands have already been tokenized. This means that, if the first character the computer gets from the input buffer is larger than 255 (decimal 128), the computer knows that it has to be a Basic command. Otherwise it's part of a parameter, that is a number, a variable or a string.

The routine starts by getting that character from the input buffer and evaluating it. For this it uses a very important routine which is written into the zero page at location 375 whenever the computer is started up. This is called "CHARGET" and works like this:

First the pointer which points at the address in the input buffer, where the next character is, is incremented by one. Then the character is fetched from that position and put into the accumulator. Finally the routine does a number of tests which set the zero-flag and the carry-flag according to the nature of the character. If it's a letter, carry is cleared, and if the number is zero, which is always used as an end marker by the computer, the zero-flag is set.

CHARGET is a very clever piece of programming, because every time the routine is used it modifies itself (this is why it is in RAM and not in ROM as most other routines of the operating system). Figure 1 shows the CHARGET routine. It's an excellent example of efficient machine code programming, and because of this worth studying thoroughly.

First the location pointer in STA is incremented (lines 10-30). Since STA is at the same time part of CHARGET

done in machine code simply by using the ASL instruction, which shifts the bits of the register or memory location one bit to the left. The result is that the overall value of the byte is doubled. Next, this value is transferred into the Y-register, which is then used as the index.

The jump table of Commodore Basic commands starts at \$A08C, which is pretty much at the beginning of BASIC ROM. First of all, the two jump-address (high and low) bytes must be found by using an indirect load. Then, the high byte of the jump address is pushed onto the stack. Then the low byte of the address is calculated in the same way, and this too is also pushed onto the stack.

Now, this address has been registered as a return address of a sub-routine on the machine stack. That is, the next time an RTS instruction is executed, the computer pulls that address automatically from the stack and jumps to it.

The routine ends by jumping to the CHARGET routine in order to get the first character of the possible parameters of the Basic command. Since CHARGET ends with an RTS instruction, the result is that the computer jumps to the command routine itself, because it will pull the address we have just stored on the stack and use it as the return address.

A pretty neat piece of programming, isn't it? You can use this method in several ways in your own programming, for example by using the ASCII-values of the first letters of a table of commands or subroutines.

Main Program

List 1 contains our program, which drives a wedge into ROM before a statement is executed, and contains two Basic commands of our own. First the vector at \$A088 is changed so that the computer jumps to our routine instead of the usual one at \$A7E4 (lines 128-135). The next routine changes the vector back to normal (lines 150-300). This effectively switches our extended Basic commands off, so that we will get the usual system error report should we use them.

Then comes the wedge itself. To start the ball rolling I have chosen two new commands: OFF and BORDER. The first one simply switches extended Basic off, by calling on the routine in lines 150-300. You activate our extended Basic by giving the direct

command STS \$B152, and you switch it off by giving our new command OFF.

The second command, BORDER, lets you change the border colour of the screen with a BASIC command. The syntax is BORDER *n*, whereby *n* is a number between 0 (black) and 15 (light grey). Once you've got the hang of how the routine works, I'm sure you won't have any problems adding two further commands which allow you to change the ink and the paper colour.

Incidentally, these two new Basic commands (as well as the others we'll introduce in future) can be executed as direct commands, as well as included in programs! But if you include them in a program you'll first have to load and activate our extended Basic. Otherwise you will get one syntax error report after the other, because the computer won't recognize any of the new commands.

The idea of our main routine is really very simple: the next character is fetched with the CHARGET routine (line 188), and then compared first with the "0" from OFF and then, if it doesn't match, with the "B" from BORDER. If it doesn't match with that either, the program flow returns back to the normal ROM-routine, which is then executed as if nothing had happened.

If it matches with the "0", then the program jumps forward to lines 160-818. The next character is then fetched and compared with the first F from OFF. If that matches, our command OFF has been given; if not, the program jumps to "normal", that is the normal ROM-routine.

Line 818 executes the command OFF itself, simply by calling on the EXTRASOFF routine in lines 250-300. Finally the next character is fetched, and the program jumps back to the ROM-routine at \$A7AE, the command BORDER is being dealt with in a similar way; first the program checks that the command has been given (lines 420-500). If yes, it is executed, otherwise the program returns to normal.

Notice that in line 450, I compare with \$80 instead of comparing with the letter "0", as you might expect. The reason for this is that OR is a command of Commodore Basic and is therefore interpreted into \$80. That is, when the word "BORDER" is put into the input buffer, the "OR" which is contained in it is tokenized into \$80,

because at this point the computer has no way of knowing that BORDER is a new command. You have to be aware of this with any new Basic command you give. If the name of the command contains the name of a Commodore Basic command, then that command will be tokenized.

Furthermore, there's one limitation in the new command names you can choose: your new Basic command mustn't start with a Commodore Basic command. If it does, only your command will be executed, but not the Commodore Basic command.

For example a new command PRINTER (to turn on the printer), would double the normal command PRINT from being executed. There is a way to overcome this limitation, but it would be rather complicated and not really worth it, since there are enough words which do not start with a Commodore Basic command.

Getting a Parameter

Our BORDER command would not be much good without a parameter which gives the colour code itself - lines 610 and 620 get that parameter. First the next character is fetched into the accumulator with CHARGET. Then we call a ROM-routine, which gets a series of ASCII numerical characters and converts them into low byte/high byte binary-decimal. The result is stored in the system variables \$14 (low) and \$15 (high).

This routine has been designed to convert the line numbers from their ASCII-form into binary-decimal as they appear on screen. It can only deal with integers in the range from 00-65599. In line 608 I get the low byte from \$14 (of course the high byte is \$15 is of no interest in this case to us) and load it into the location \$288, which changes the border colour.

Notice that I use the X-register for this, and not the accumulator. This is because I want to keep the character in the accumulator, since I'll need it for when I return to the ROM-routine at \$A7AE.

Finally

When you try out the BORDER command, you will notice that it doesn't work with variables. In the next article we will overcome this limitation and introduce a COLOUR command which will change border, paper and ink colour all in one go.



Professional Print quality on a Plus/4? Paul Eves takes a look at YER's latest utility.

```

PRINT #1,CHR$(27);"ABCDEF0123456789";
PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";

PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";
PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";

PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";
PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";

PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";
PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";

PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";
PRINT #1,CHR$(27);"ABCDEFGHIJKLMNPQRSTUWXYZ";

```

Print Enhancer

In these days of the Amiga, C128 and C64, it is a refreshing change to see that someone has not forgotten the poor old +4. Print Enhancer, from York Electronic Research, is an excellent +4 program, used primarily with the MP5861 and 1525 printers. Unlike the Printer IV Rom chip which I reviewed last year, this program is software dependent. This has obvious disadvantages, mainly speed of use and accessibility. But the advantages outweigh these. For example, fonts can be changed midway through a line, and the user can design their own fonts. Other options are also available. So what exactly is Print Enhancer? Basically, the program enables you to produce impressive letters and documents with true descenders. You can use custom-designed fonts, or select from a choice of 15 built-in ones. The program supports proportional spacing, underlining, superscripting and subscripting. The program may be used in one of three ways: with the J+1 built-in word processor, the Script cartridge or through a Basic program.

Once the program is loaded and running, there are four fonts of 96 characters resident in memory. These fonts are in four separate banks, which can be switched in and out as will using special codes. More fonts may be

loaded in as and when required. This aspect of the flexibility of the program is what in my opinion makes this program stand out. It means that you are no longer restricted to just one typeface. Thus, your documents or letters take on a more professional aspect. A selection of the special codes are shown below. Each code is preceded by a command character, and these command characters vary from 3-1. Script plus and basic. The command characters are CHR\$(22), Escape CHR\$(27) and CHR\$(27) respectively.

- 0 - Selects character set bank 0
- 1 - Selects character set bank 1
- 2 - Selects character set bank 2
- 3 - Selects character set bank 3 (These commands should be used within, or at the end of a line)
- 4 - Turns on/off underlining
- 5 - Turns on/off justification
- 6 - Loads named character set (W/C-codes may be used)
- 7 - Set single line spacing
- 8 - Sets one and a half line spacing
- 9 - Sets double line spacing (Commands 5 - 9 should be on a line of their own)

Therefore the statement: PRINT #1,CHR\$(27)"bank0"

PRINT #1,CHR\$(27)"3" would load the file named bank0 into bank 3.

Although to get the full benefit of Print Enhancer a few special commands need to be learnt. Thankfully though, YER have made these as few as possible. Therefore I feel that once you have used the program a couple of times, you will know all you need, without having to constantly look up the manual.

Finally, we come to the font designer. Like the rest of the program, the designer is straightforward to use, with only a few keys to remember. Once you have designed your own fonts, these are saved for use later. You may thus mix your own fonts with those supplied.

The keys used within the designer are as follows:-

Escape to get into edit mode. * and / for setting or raising points. Space bar for selecting a character to edit. The Fkeys 1 through 8.

All in all I was impressed with this program. Good +4 utility programs are hard to find these days. Above are a couple of examples of Print Enhancer's capabilities.

28 Line Screen

Extra lines on your 80 column display

A number of applications use status lines to update the user, telling him/her to carry out a particular action. There are times when you would like to include this type of message in your own programs. To do this you could set aside the top or bottom lines of the screen (by using interrupts), use multiple screens or a string of control codes to place your message on the screen. The window facility of the C128 could also be used. However, these techniques have their disadvantages. Normally a status line is just that, a line! Using separate screens to inform the user to insert a disk into the drive seems rather wasteful. The other methods involve overwriting existing text or reducing the number of lines on the screen.

The 80 column video chip offers another solution.

Register number six of the VDC contains the number of lines that are to be represented on the screen, and changing this number allows more than the normal 25 lines to be shown (or less than 25 for that matter). The number of lines displayed is dependent on the quality of the monitor used. I use a Commodore 1900M green screen monitor and I found that I can display up to five extra lines without any problems.

The program presented here allows you to type in up to 35 messages of one, two or three lines (ie. 88, 168 or 248 characters in length) that you can then print to the extra lines on the screen with ease from within your own programs.

Getting it in

The Basic program presented here produces a machine code routine made up of three parts, a routine for writing the messages, a table of pointers and thirdly the messages themselves, stored as upper/lower case. This is all stored from \$1300 to \$18FF and once assembled it can be called from either Basic or machine code.

The machine code routine for writing to the VDC is stored from \$1300 to \$13BC. Immediately after this there are 180 bytes set aside for pointers. Each message requires four pointers, two for the address of the message and one byte each for the length and the attributes (colour flashing etc.). This leaves just over 2000 bytes free for the text.

Accessing the VDC

The base address for the VDC is located at \$D600 and it has a total

of 30 registers. Unfortunately the VDC cannot be accessed in the same way as the VIC or SID chips, that is, the various registers can't be POKEd or PEEd directly. All communication between the outside world and the VDC chip must take place through two registers at \$D680 and \$D681. As a result though, any program that uses the VDC is by necessity fairly complicated.

When writing to a register in the VDC, the register number is placed in \$D680 and the new value for the register is placed in \$D681. If you wish to read the value of a register, the number of the register is placed in \$D680 and the VDC returns the value in \$D681. The registers that this program uses are:

- Reg 6 Number of lines displayed.
- Reg 7 The upper border of the screen.
- Reg 18 Hi byte of address in VDC to be manipulated.
- Reg 19 low byte of Reg 18
- Reg 20 Hi byte of the start address of attribute memory.
- Reg 20 Number of characters to be written to address pointed to in Reg 18 and 19.
- Reg 31 Data, the actual character codes are written here.

How it works

There now follows an explanation of the program for those interested in how the routine works.

1000 - Calls a subroutine to **POKE** the machine code into memory, lines 2140-2190. The values are in hexadecimal, some readers may find it easier to use the built-in monitor to write this part of the program, if as replace line 1930 with:

```
HEXFAST=COLOR1+COLOR2-WIN-  
DOWN+SCAL+PRINT+CHR$(7)+CHR$(10)
```

and omit line 1940.

In addition the subroutine sets up the variable names used and also allows you to pick from one, two or three extra lines in the display.

Note there is a **KERNAL** routine to reset the **VDC** located at **HEIDC** but this does not reset all the registers to their default values. I found it necessary to use the **HOME** routine at **\$E09**, unfortunately **SID** is also reset and cleared! **CHR\$(7)** is the "bell" and printing this gets **SID** looking like himself again.

Memory location **\$A3F** is two page contains a pointer for the **VDC** attribute RAM and normally contains eight.

Once the machine code has been read and the screen is set up the extra lines appear at the bottom of the screen filled with reverse stars.

1010 to 1080 - Control loop calling various subroutines. The loop terminates when 25 messages have been entered or there is no space left. An exit is also forced if "q" is typed in.

1100 to 1310 - Subroutine to input the message string. All alphanumeric characters are accepted i.e. **UPPER** and lower case.

When editing your message only the delete key can be used, on most keys, **HOME**, **CLR** etc. will not operate. The subroutine will terminate when **RETURN** is pressed or the number of characters exceeds the limit for the screen.

1340 to 1400 - Subroutine to select the attribute values. This routine allows you to select the colour of the message, whether it flashes, is underlined or printed in reverse.

1480 to 1490 - Subroutine to write message to memory.

1510 to 1610 - Subroutine to display message. The message is displayed as typed in with the attributes selected. At this point the attributes can be changed or the message can be rewritten. If the message is accepted three pointers are updated and the next message can be typed in.

1650 to 1790 - This subroutine displays the number of bytes which are still free for you to use.

1820 to 1830 - Subroutine for audio warnings.

1850 to 1900 - Subroutine for single key press. Used for Yes/No answers **ky(0)** and **ky(2)** are the keys to be tested i.e. "y" and "n" (or any other two keys). Once all of the messages have been typed in or you run out of space, the machine code, pointers and messages are **SAVED** on disk. The program is **SAVED** as **MESSAGES** and overwrites any other programs with this name. You can of course change this program to any name that you wish.

Machine code program

Once compiled, the machine code program has three main entry points. One is set up the screen, one to clear the extra lines and the routine to print the messages. Details on the three routines follow:

Setting up the screen

This is done by entering:

```
SYS DEC("1380") or JSR $1380 from  
machine code.
```

the routine carries out the following:

1) Moves the attribute memory of the **VDC** from **\$0800** to **\$1000**.

If you look at the memory map of the **VDC** you can see how this is possible.

\$0800 - **\$0FFF** Screen RAM

\$0840 - **\$1FFF** Colour/attribute RAM

\$1000 - **\$1FFF** Free RAM

\$1800 - **\$1FFF** Character generator.

As you can see there is **4K** of memory available to the user without interfering with the character sets.

2) Clear the extra lines

3) Move the top border of the screen up

4) Display the extra lines

Clearing the extra lines

This is done with the command:

```
SYS DEC("1243") or JSR $1243 from  
machine code.
```

Printing the messages

Printing of the messages requires that you know the number of the message that you want to print. The syntax for this command is:

```
SYS DEC("1246"),N
```

where **N** is the message number (0-24).

If calling the routine from machine code you must load the accumulator with the message number before the call is:

```
LDA ; message number  
JSR $1246; Call routine.
```

Note: Messages are numbered from 0 to 24 NOT 1 to 25.

On your own

Even though the program may at first sight seem a little complicated to use you should get used to it after playing around with it a few times. Using this routine will help to give your **C128** programs a professional quality that is only usually seen in commercial programs.

PROGRAM: 24 LINE SCREEN

```
1000 GOSUB 1050          : GET  
**** SEND MACHINE CODE DATA ****  
1010 OS UNTIL PR - 8 OR SP - 8  
1020 GOSUB 1150          : GET  
**** INPUT STRING ROUTINE ****  
1030 IF INK="Q" THEN EXIT  
1040 GOSUB 1250          : GET  
**** SET ATTRIBUTES HOLDING ****  
1050 GOSUB 1350          : GET  
**** WRITE STRING TO MEMORY ****  
1060 GOSUB 1450          : GET  
**** ACCEPT MESSAGE ? ****  
1070 GOSUB 1550          : GET  
**** DISPLAY SPACE LEFT ****  
1080 LOOP  
1090 GOSUB 1650          : GET  
**** GIVE TO DISK ****
```




PLAYING THE GAME

A super fruit machine simulator

by R. Jaycocks

When the game is executed by running the basic line or typing SYS4109, instructions will appear on the screen. After pressing on key the scoring table is printed up. At the beginning of the game is, after the instructions etc. the time will be printed in the top left hand corner, this will show you how much time is left. To spin the reels you must have some plays in the plays counter, this is achieved by pressing key 'P' which can only be activated if you have some money left. After inserting the money you may get a hold. This is shown by the hold keys going a lighter red and the cancel key going a lighter green. Pressing keys '1', '2', or '3' will hold the desired reels. If you hold the wrong reel pressing 'C' will cancel the holds allowing you to rehold the desired reels. Pressing 'S' will spin the reels. If you get a win you can gamble the winnings up to 255. Pressing 'G' will gamble the winnings while pressing 'N' will collect the winnings. You may get a nudge and this is detected by a clear 'white' noise

and the nudge panel showing random nudges. Pressing 'N' will stop the nudge panel to the current nudge. You may now bring the reels up or down until the number of nudges has decreased to zero. Pressing the shift buttons with keys '1', '2' or '3' will bring the desired reel up while pressing keys '1', '2' or '3' will bring the desired reel down.

After you have typed in listing one type listing 2 in the correct location making no errors as this is the check program.

Now type in the following line.

G 0800 83 0000 380F to print the checksums to screen as,

G 0800 84 0000 380F to print the checksums to printer device number four.

If any of the checksums do not correspond to the ones in table 1 then recheck the corresponding piece of memory. Once everything is O.K type S/FRUIT MACHINE_A,1041,2410 and press return.

SUMMARY

Keys '1', '2' or '3' operates reels 1,2 or 3 respectively.

Key 'N' is for selecting the nudge.

Key 'S' is to spin the reels or collect the winnings.

Key 'C' is for cancel or gamble.

Key 'P' is for insert.

GETTING IT IN

Go into monitor and type in the following:

F 0000 0000 00

Then type in listing 1

Note: Holding all three wheels will cause a delay of approximately one and a half seconds. This time delay can be altered by poking the desired delay in location \$117A. 0 is the slowest delay while 1 is the fastest. The delays are in one fifth of a second. i.e. a delay of 100 is 2 seconds.

An alarm will sound once the timer is decreased to 30 seconds, therefore indicating that you have very little time left.

TABLE 1

1000	D0	0250	85	10A0	3A	0000	EF	1140	D8	1190	A0	1100	8C
1220	E4	1280	ED	1210	D2	1320	61	1370	5C	1570	9C	1410	CB
1440	08	1480	8D	1500	8C	1550	29	15A0	64	15F0	75	1640	3D
1680	CB	16E0	65	1730	E8	1780	83	17D0	60	1820	90	1870	FA
18C0	79	1910	64	1960	E4	1980	C9	1A20	3A	1A50	0A	1A80	F5
1A70	C3	1B40	EE	1B90	EA	1B30	36	1C70	51	1C80	47	1CD0	A0
1D20	68	1D70	36	1DC0	C3	1E10	84	1E80	43	1E90	CE	1F00	D2
1F50	51	1FA0	43	1FF0	14	2040	8E	2090	25	2050	95	2130	A5
2180	4D	21D0	4E	2220	1D	2270	C6	22C0	93	2310	58	2360	C5
2380	58	2400	ED	2450	68	24A0	D8	24D0	14	2540	4E	2590	28
25E0	72	2630	36	2680	A6	26D0	F8	2720	47	2770	97	27C0	21
2810	18	2860	A9	28E0	B5	2900	81	2950	85	2A40	E6	2AFO	1D
2A80	58	2A80	CF	2A80	88	2B30	4D	2B80	AA	2B00	7F	2C20	E6
2C70	33	2CC0	46	2D10	CD	2D60	87	2D80	14	2E00	AA	2E50	9C
2E80	F4	2EFO	E8	2F40	67	2F90	E3	2F20	F7	3020	A8	3080	D0
30C0	D3	3120	84	3170	9E	31C0	5D	3210	81	3260	52	3280	E3
3300	A3	3350	E1	33A0	13	33F0	97	3440	2A	3490	44	34E0	1D
3520	D0	3580	89	35D0	EA	3620	5A	3670	1F	36C0	12	3710	2F
3760	97	3780	E7	3800	57	3820	F8	38A0	F8	38F0	78		

PROGRAM: SUBROUTINE LOADER

```

02 0 PRINT" (CLR,DOWN) (RUBSON)R(
RUBSOFF)JUN PROGRAM OR (RUBSON)
L(RUBSOFF)LOAD SUBROUTINE?"
91 1 GETAB: IFAB<>"R"ANDAB<>"L"AND
NDAB<>"(SR)"AND NB<>"(SL)"TH
EN1
09 2 FORA=0TOL5:POKE55255+A,5:N
EXT:IFAB="R"ORAB="(SR)"THEM5
00
00 3 INPUT"SUBROUTINE FILENAME"
:NB:L=LEN(NB):IFNB=CHR$(13)O
RL=0THEMEND
03 4 FORA=1TOL:POKE185+A,ASC(M
ID$(NB,A,1)):NEXT(POKE186,0):
REM POKE186,1 FOR TAPE
50 5 POKE183,L:POKE184,1:POKE18
5,0:IFPEEK(186)=LANDNB="**"TH
ENPOKE183,0
04 6 POKE187,186:POKE188,7:POKE
189,PEEK(45)-2:POKE190,PEEK(
46):POKE147,0:SYS52531
53 7 (PST-B)ORST-OTHERNSYSH2201:
POKE45,PEEK(174):POKE46,PEEK
(175)
00 8 END
30 9 CLR:PRINT"CLR";

```

no remembering routines available, it will be necessary to ensure that the line numbers aren't duplicated in the program or confusion will result.

The maximum value for a line number is 65535, so it is best to start numbering subroutine lines from 60000. Each of these mini-programs should rarely need modification, but allowing a gap of three line numbers between each program line should leave room for any future changes or variations.

Another convention that must be adhered to is standardization of variables. It would be pointless to have a vast library of routines if it meant that a series of variable swapping had to take place every time a GOSUB statement was executed. For example, sound routines always access the SID chip and graphics always use the VIC chip, so setting up base variables of VIC=53248 and SID=54272 would make a good start.

A subroutine library is much easier to use from disk, but cassette based systems can be set up if careful note is taken of the nature of the tape format for each subroutine.

The final problem is one of appending the subroutine onto the program. To make this as easy as possible, a short subroutine loading program needs to be loaded before programming starts. This occupies the first ten program lines, and the new program should always start at a line value from 10 onwards.

How It Works

Lines 0 and 1 allow the programmer to decide whether a subroutine is going to be loaded or if the program is to be tested. It uses the GET statement so only a single keypress will be needed. To indicate which keys are valid, the first letter of each word is highlighted.

```

0 PRINT" (CLR,DOWN)
(RUBSON)R(RUBSOFF)JUN
PROGRAM OR
(RUBSON)L(RUBSOFF)LOAD
SUBROUTINE?"
1 GETAB: IFAB<>"R"ANDAB<
>"L"ANDAB<>"(SL)"ANDAB
<>"(SR)"THEN 2

```

With such an input, users assume that the user will press the unshifted key. As you can see from line 1, the program uses the logical operator, AND, to test which of the four possible characters has been entered and if none of these are pressed the line loops back to get another keypress.

By the time line 2 is executed, A5 will contain one of four possible characters, but initially the first 16 locations on the screen are given a foreground colour of blue. The reason for this will become clear later. When A5 is tested, the program jumps to line 3 if the character is 'R' or a shifted 'R' and this is why the actual program should start at line 10 or higher. Line 3 clears the screen and the variables that have been used so that the real program starts off without any declared variables which could otherwise affect the way it runs.

```

2 FORA=0TOL5:POKE55255+A,
A,5:NEXT:IFAB="R"ORAB="(
SR)"THEN4
3 CLR:"(CLR)"

```

If neither 'R' key is detected, the program safely assumes that one of the 'L' keys was pressed and the subroutine loader asks for a filename. Pressing the return key without typing anything in, a null string entry, is treated as an abort request. This is included in case the loader is entered accidentally. Cassette users who wish to load a program without entering a name should enter an asterisk at the filename input prompt.

```

3 INPUT"SUBROUTINE
FILENAME";NB:L=
LEN(NB):IF NB=
CHR$(13)ORL=0THEMEND

```

Line 4 stores the filename asc character at a time at the top right hand corner of the screen. This is the area whose foreground colour was changed in line 2. Because the foreground now matches the background, these letters are invisible.

```

4 FORA=1TOL:POKE1803+A,
ASC(MID$(NB,A,1)):NEXT
(POKE186,0):REM POKE
186,1 FOR TAPE

```

Location 186 is poked with the device number 1 or 3 depending on whether tape or disk is being used.

Relocated Load

The following lines set up the necessary parameters for a relocated load. First, the filename information is stored by placing the filename length in 185. Secondly, the high byte of the filename location is stored in location 188 and the low byte in 189. These values are calculated from the position of the first letter of the filename, 8024 in this case, and, to find the high byte, this number is divided by 256 to give 4 and the remainder is the low byte. In this case there is no remainder so the low byte is zero.

```
POKE185, L:POKE187, 0:P
POKE188, 4:IFPEEK(186)=1
AND#4="R" THENPOKE189, 0
```

The IF statement checks to see if an unnamed tape file is going to be loaded. If this is true, the filename length is reset to zero.

Location 184 holds the file number and 185, the secondary address, is set to zero to denote a relocated load. The computer needs to know the address of the relocated position. Obviously, the subroutine is going to be added to the end of the program in memory, and the end location is stored in locations 45 and 46, low byte first and then high byte. The low byte is actually two locations beyond the required load position, hence the -2 in the equation. The values obtained by poking into these locations are then poked into 193 and 196.

```
POKE184, 1:POKE185, 0:P
POKE195,PEEK(45)-2:
POKE196,PEEK(46)
:POKE147, 0:SYS82631
```

Before loading via command, the value of zero is poked into 147 to indicate a load rather than a verify action. Calling SYS82631 executes the load but bypasses some of the instructions which would upset the values that have just been set.

Just in case the file doesn't exist, a check on variable ST reveals a disk load (and if the value is not 64, a similar check cannot be made on tape loads as an ST value of zero is also permitted.

```
71FRT=64ORGT=OTHERSYS4
2291:POKE45,PEEK(174):
POKE46,PEEK(175)
8 END
```

When the ST check is successful, the program jumps to a ROM routine which does some internal housekeeping on the program lines to make sure that they all latch together properly. Now that the program has been lengthened, locations 45 and 46 need to be updated. The end-of-load address is stored in 174 and 175 as the poked value from there is stored into 45 and 46.

After this all that is left is an end command to make sure that the loader program doesn't run on to execute the program under construction.

Words of Caution

When a cassette load is terminated by pressing the stop key, part of the program will have been loaded and will appear when the program is listed. At this point the end of program pointers will not have been set, so a new subroutine can be safely loaded. It is better not to abort a load and when it finishes, the unwanted lines can be deleted.

Disk users will experience problems if using a colon in the load command. This will result in an EXTRA IGNORED! message appearing on the screen. To overcome this, type the filename in after an opening quote mark (obtain plus the 2 key).

Owners of fast-load cartridges may find that the loader only works at normal speed because the program jumps into the ROM and avoids the load writer at 8167. In some cases the fast load can be accessed by substituting POKE790,0 for POKEL47,0 in line 8 and changing the SYS command to SYS82631. I developed the routine using Dolphin DOS and no changes are necessary to access the fast loader in this case.

As a final tip, keep the program name down to ten characters so that the starting line number can be isolated. For example, an input routine could be called "KEYPRESS_80000".

Now all that is needed is a series of subroutines to get working and maybe used in any of which you are particularly proud. We can't offer you fortune but a certain amount of fame will be afforded through the pages of Four Commodore.

Program Breakdown

Lines	Action
0-1	Choose between loading a subroutine or running the program
2	Change first line (end-of-load to start bit). Check for program execute
3	Get filename, filename length and exit if necessary
4	Store filename and set input device
5	Set filename parameters and check for null tape filename
6	Set file, load parameters and execute modified LOAD
7	Check ST and, if valid, return lines and update program end parameters
8-8	End the loader program. Clear screen and variables for the RUN option

Variables Used

AS	Load or run keypress value
A	General purpose loop variable
NS	Filename
L	Filename length
ST	System variable that indicates the result (Status) of a LOAD attempt

Locations Accessed

45-46	End-of-program pointer
147	Load/verify flag
174-5	End-of-load address
182	Filename length
184	File number
185	Secondary address
186	Input/output device
187-8	Filename location
193-6	Relocated load address
8033	Start of screen RAM - 1
42291	ROM routine to rechain program lines
55295	Start of colour RAM - 1
62631	Special entry point into the operating system's LOAD routine

Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out

It's three o'clock in the morning. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from Four Commodore. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The Four Commodore Software Service makes available all of the programs from each issue on both cassette and disk at a price of £5.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the related magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 1HL.
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The Disk

Programs on the disk will also be supplied as totally working cassettes, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be loaded from disk on to tape.

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Contributions

So you own a Commodore? So you've written some programs? So why haven't you sent them to us?

Your Commodore is always on the look-out for new programs, hints and tips, articles and even regular series. In fact, if you have something that you think could be of use to other Commodore owners we want to hear about it.

So if you have got something which you think we may be interested in, how do you go about submitting it to us?

Below you will find a lot of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.

2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.

3) On the very first page you should put the following:

Name of the article
Machine that it is for
Any extras required - disk, printer etc.
Your name
Your address
Your telephone number

4) The top of every page should have the following information on it:

Abbreviation of the article title
Your name
The page number

For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/1.5 units/1

5) Please make sure that you do not make any additional marks on your text especially underlining.

6) Try and write in clear concise English, it does not have to be a work of literature but it must be comprehensible.

7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.

8) If possible, enclose a listing of all programs.

9) Under no circumstances use a staple to hold the pages together. Use a paperclip instead.

10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.

11) Programs under 10 lines can be included in the text. If your program is longer than this you must enclose a disk or cassette.

12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

13) Photographs, if necessary, must be either black and white prints or colour slides. We can take them ourselves so don't worry about this too much.

14) Submissions of any length are welcome. If you have a free line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.

15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £200.00.

16) All payments are made in the month that the magazine containing your article has appeared in print.

17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.

18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.

19) The last and most important point to make is 'get writing', we are waiting for your articles.

COMMODORE

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line-checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk

immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and

press RETURN again.

If you want to turn off the checker simply type STOP[IN] and the screen will return to the familiar blue colour. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same STOP command.

















No system is foolproof but the chances of two errors cancelling one another out are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time.

TE

Mnemonic Symbol Keypress

[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		F1 key
[F2]		SHIFT & F1 key
[F3]		F3 key
[F4]		SHIFT & F3 key
[F5]		F5 key
[F6]		SHIFT & F5 key
[F7]		F7 key
[F8]		SHIFT & F7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic Symbol Keypress

[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LBARROW]		←
[UPARROW]		↑
[P]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		rev text
[Letter]		CRM + letter
[Steter]		SHIFT + letter

YOUR

COMMODORE

Listings

Tape Menu



PROGRAM: TAPE MENU

```

81 10 PEEKING:1,PEEKING:1
82 20 POINT*(CLR,DOWN,RIGHT)PE
CIR (VKEY)STOP (VKEY)FF) ON C
WEXITE"
83 30 WAIT,50,50
84 40 P=0:P=20:L=10:R=0:PRER,4
85 45 PRINTM(LI)"CT,BA,CLC,
86 55 PRINTM(R)"** (P-CI)TAPE
MENU (CT,5)***
87 60 PRINTM(CI)"123,500,90"
88 70 PRINT"DOWN,CO)PASC NAME
(SPEC)TAPE COUNTER"
89 80 PRINT"60(SPEC)ASC 14 CH
100(SPEC)FROM 120(4)50 (GREEN)"
90 90 PRINT"100, READ,BA,E,E
91 100 IF(=)TRER-E-1
92 110 PRINT"UP"
93 120 PRINTM(L)400"90)"
94 130 PRINTM(R)200"90)"
95 140 PRINTM(C)200"90)"
96 150 PRINTM(B)200"
97 160 PRINT"DOWN,PEER,5100
7)CROOK & NO AND PAGES" "END
98 170 NEXT
99 180 IF(=)TRER-L-L,POW-IT
OL,POINT NEXT
100 190 PRINT"DOWN,PURPLE,5100
7)CROOK & NO AND PAGES" "END
101 200 NEXT
102 210 CONTINUE:1700-CORR(L)TE
ORIG
103 220 M=0:1700" "TRER20
104 230 PRINTM(L)5)"(PURPLE,UP
7)M"
105 240 CORRU000
106 250 IF(=)CORR(L)5)TRER200
107 260 PRINTM
108 270 GOTO:1700-CORR(L)10 TRER
200
109 280 B=1:COR(100)-80"110
110 290 B=50:(140)-48:B=40-B
111 300 POINT*(CLR,DOWN)"INPUT"
DOWN,PEER(D)KEYOFF)AVE ON
112 310 IF(=)S"TRER40)GOTO30
113 320 IF(=)C"TRERPRINT"UP)1
TRER2000
114 330 RETURN:170-TRER50
115 340 FOR(1700-CORR(L)5)M=0:R
EST
116 350 IF(=)S"TRER40
117 360 POINT*(CLR,DOWN)FILE)M00
(SPEC,DOWN,DOWN)"(P)VKEYFF
)"PRINT
118 370 IF(=)TRER40
119 380 INPUT"DOWN,PEER(P)900
FF)PROGRAM ON (VKEY)P)KEYCT"
110"70,30-LEFT(70,1)-170
-FF"TRER400
120 390 INPUT"DOWN,PEER(S)PASC
FF)PROGRAM CLR(L)B=LEFT(L)B,L)
121 400 C=0:0)GOTO420
122 410 C=C+4-E
123 420 FOR(L,50-POINT)DOWN)P)R
20 P)700 AND RETURN WHEN DEL
EY"
124 430 CORRU700
125 440 FOR(L,7)T=1
126 450 IF(=)TRER-C=1
127 460 IF(=)TRER-C=1
128 470 IF(=)TRER=0)1
129 480 IF(=)C"14,70)1)TRER400
130 490 CORRU,50
131 500 POINT"DOWN)PASC RETURN
TO CONTINUE"CORRU700
132 510 PRINT"DOWN)COUNTER" ",
E"PRINT(LEFT,SPCL)1"
133 520 PRINT"DOWN)PASC PLAY &
NO RETURN WHEN READY"
134 530 CORRU700
135 540 IF(L)P"TRER400
136 550 IF(=)P"TRERPRINT"DOWN
)7000 FILE WILL LOAD NOW"
137 560 POINT"DOWN)7000 PROGRAM
WILL LOAD NOW"
138 570 CORRU700:PEER,47,PEER,1
20,LOAD" ",L)GOTO440
139 580 POINT"CLC,DOWN)5100 FROM
FILE IS ALREADY LOADED"DOT
ORIG
140 590 IF(=)P"TRERPRINT"DOWN)
)7000 PROGRAM WILL LOAD AND R
UN NOW"
141 600 CORRU700:PEER,47,PEER,1
20,PEER(1),101)PEER(L)DOT
ORIG
142 610 END
143 620 L=0:P=10
144 630 P=0:1
145 640 P=1:DOWN-170)DOWN)P
146 650 IF(=)TRER50
147 660 RETURN

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LISTINGS

10700	80	85	86	86	87	87	87	87	87
10800	38	88	88	88	88	88	88	88	88
10900	17	48	48	48	48	48	48	48	48
11000	87	27	30	29	27	18	19	19	19
11100	88	28	28	28	28	28	28	28	28
11200	91	101	89	90	90	90	90	90	90
11300	40	21	17	18	18	18	18	18	18
11400	85	87	85	86	86	87	87	87	87
11500	71	10	10	10	10	10	10	10	10
11600	42	21	17	18	18	18	18	18	18
11700	86	10	10	10	10	10	10	10	10
11800	83	80	80	80	80	80	80	80	80
11900	83	83	83	83	83	83	83	83	83
12000	90	89	79	86	87	87	87	87	87
12100	92	92	92	92	92	92	92	92	92
12200	88	88	88	88	88	88	88	88	88
12300	45	44	44	44	44	44	44	44	44
12400	81	81	80	81	81	81	81	81	81
12500	88	88	88	88	88	88	88	88	88
12600	88	88	88	88	88	88	88	88	88
12700	89	89	89	89	89	89	89	89	89
12800	89	89	89	89	89	89	89	89	89
12900	89	89	89	89	89	89	89	89	89
13000	89	89	89	89	89	89	89	89	89
13100	89	89	89	89	89	89	89	89	89
13200	89	89	89	89	89	89	89	89	89
13300	89	89	89	89	89	89	89	89	89
13400	89	89	89	89	89	89	89	89	89
13500	89	89	89	89	89	89	89	89	89
13600	89	89	89	89	89	89	89	89	89
13700	89	89	89	89	89	89	89	89	89
13800	89	89	89	89	89	89	89	89	89
13900	89	89	89	89	89	89	89	89	89
14000	89	89	89	89	89	89	89	89	89
14100	89	89	89	89	89	89	89	89	89
14200	89	89	89	89	89	89	89	89	89
14300	89	89	89	89	89	89	89	89	89
14400	89	89	89	89	89	89	89	89	89
14500	89	89	89	89	89	89	89	89	89
14600	89	89	89	89	89	89	89	89	89
14700	89	89	89	89	89	89	89	89	89
14800	89	89	89	89	89	89	89	89	89
14900	89	89	89	89	89	89	89	89	89
15000	89	89	89	89	89	89	89	89	89
15100	89	89	89	89	89	89	89	89	89
15200	89	89	89	89	89	89	89	89	89
15300	89	89	89	89	89	89	89	89	89
15400	89	89	89	89	89	89	89	89	89
15500	89	89	89	89	89	89	89	89	89
15600	89	89	89	89	89	89	89	89	89
15700	89	89	89	89	89	89	89	89	89
15800	89	89	89	89	89	89	89	89	89
15900	89	89	89	89	89	89	89	89	89
16000	89	89	89	89	89	89	89	89	89
16100	89	89	89	89	89	89	89	89	89
16200	89	89	89	89	89	89	89	89	89
16300	89	89	89	89	89	89	89	89	89
16400	89	89	89	89	89	89	89	89	89
16500	89	89	89	89	89	89	89	89	89
16600	89	89	89	89	89	89	89	89	89
16700	89	89	89	89	89	89	89	89	89
16800	89	89	89	89	89	89	89	89	89
16900	89	89	89	89	89	89	89	89	89
17000	89	89	89	89	89	89	89	89	89
17100	89	89	89	89	89	89	89	89	89
17200	89	89	89	89	89	89	89	89	89
17300	89	89	89	89	89	89	89	89	89
17400	89	89	89	89	89	89	89	89	89
17500	89	89	89	89	89	89	89	89	89
17600	89	89	89	89	89	89	89	89	89
17700	89	89	89	89	89	89	89	89	89
17800	89	89	89	89	89	89	89	89	89
17900	89	89	89	89	89	89	89	89	89
18000	89	89	89	89	89	89	89	89	89
18100	89	89	89	89	89	89	89	89	89
18200	89	89	89	89	89	89	89	89	89
18300	89	89	89	89	89	89	89	89	89
18400	89	89	89	89	89	89	89	89	89
18500	89	89	89	89	89	89	89	89	89
18600	89	89	89	89	89	89	89	89	89
18700	89	89	89	89	89	89	89	89	89
18800	89	89	89	89	89	89	89	89	89
18900	89	89	89	89	89	89	89	89	89
19000	89	89	89	89	89	89	89	89	89
19100	89	89	89	89	89	89	89	89	89
19200	89	89	89	89	89	89	89	89	89
19300	89	89	89	89	89	89	89	89	89
19400	89	89	89	89	89	89	89	89	89
19500	89	89	89	89	89	89	89	89	89
19600	89	89	89	89	89	89	89	89	89
19700	89	89	89	89	89	89	89	89	89
19800	89	89	89	89	89	89	89	89	89
19900	89	89	89	89	89	89	89	89	89
20000	89	89	89	89	89	89	89	89	89

LISTINGS

120288	10	10	88	47	88	80	48	91
120289	56	75	40	57	58	78	87	87
120290	56	84	87	57	78	80	91	98
120291	40	46	00	40	40	40	40	40
120292	10	10	00	00	00	00	00	00
120293	00	46	10	08	08	08	08	08
120294	56	48	13	05	05	05	05	05
120295	13	48	38	08	03	05	10	15
120296	49	27	05	13	08	13	13	19
120297	00	00	48	17	80	80	10	00
120298	00	10	40	20	10	08	11	00
120299	00	01	01	01	01	01	01	01
120300	47	13	00	07	00	00	00	01
120301	48	48	01	01	01	01	01	01
120302	01	00	01	01	00	00	01	40
120303	10	17	03	10	00	00	00	00
120304	00	00	10	00	00	00	00	00
120305	00	00	00	00	00	00	00	00
120306	00	00	00	00	00	00	00	00
120307	00	00	00	00	00	00	00	00
120308	00	00	00	00	00	00	00	00
120309	00	00	00	00	00	00	00	00
120310	00	00	00	00	00	00	00	00
120311	00	00	00	00	00	00	00	00
120312	00	00	00	00	00	00	00	00
120313	00	00	00	00	00	00	00	00
120314	00	00	00	00	00	00	00	00
120315	00	00	00	00	00	00	00	00
120316	00	00	00	00	00	00	00	00
120317	00	00	00	00	00	00	00	00
120318	00	00	00	00	00	00	00	00
120319	00	00	00	00	00	00	00	00
120320	00	00	00	00	00	00	00	00
120321	00	00	00	00	00	00	00	00
120322	00	00	00	00	00	00	00	00
120323	00	00	00	00	00	00	00	00
120324	00	00	00	00	00	00	00	00
120325	00	00	00	00	00	00	00	00
120326	00	00	00	00	00	00	00	00
120327	00	00	00	00	00	00	00	00
120328	00	00	00	00	00	00	00	00
120329	00	00	00	00	00	00	00	00
120330	00	00	00	00	00	00	00	00
120331	00	00	00	00	00	00	00	00
120332	00	00	00	00	00	00	00	00
120333	00	00	00	00	00	00	00	00
120334	00	00	00	00	00	00	00	00
120335	00	00	00	00	00	00	00	00
120336	00	00	00	00	00	00	00	00
120337	00	00	00	00	00	00	00	00
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120339	00	00	00	00	00	00	00	00
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120348	00	00	00	00	00	00	00	00
120349	00	00	00	00	00	00	00	00
120350	00	00	00	00	00	00	00	00
120351	00	00	00	00	00	00	00	00
120352	00	00	00	00	00	00	00	00
120353	00	00	00	00	00	00	00	00
120354	00	00	00	00	00	00	00	00
120355	00	00	00	00	00	00	00	00
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120358	00	00	00	00	00	00	00	00
120359	00	00	00	00	00	00	00	00
120360	00	00	00	00	00	00	00	00
120361	00	00	00	00	00	00	00	00
120362	00	00	00	00	00	00	00	00
120363	00	00	00	00	00	00	00	00
120364	00	00	00	00	00	00	00	00
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120366	00	00	00	00	00	00	00	00
120367	00	00	00	00	00	00	00	00
120368	00	00	00	00	00	00	00	00
120369	00	00	00	00	00	00	00	00
120370	00	00	00	00	00	00	00	00
120371	00	00	00	00	00	00	00	00
120372	00	00	00	00	00	00	00	00
120373	00	00	00	00	00	00	00	00
120374	00	00	00	00	00	00	00	00
120375	00	00	00	00	00	00	00	00
120376	00	00	00	00	00	00	00	00
120377	00	00	00	00	00	00	00	00
120378	00	00	00	00	00	00	00	00
120379	00	00	00	00	00	00	00	00
120380	00	00	00	00	00	00	00	00
120381	00	00	00	00	00	00	00	00
120382	00	00	00	00	00	00	00	00
120383	00	00	00	00	00	00	00	00
120384	00	00	00	00	00	00	00	00
120385	00	00	00	00	00	00	00	00
120386	00	00	00	00	00	00	00	00
120387	00	00	00	00	00	00	00	00
120388	00	00	00	00	00	00	00	00
120389	00	00	00	00	00	00	00	00
120390	00	00	00	00	00	00	00	00
120391	00	00	00	00	00	00	00	00
120392	00	00	00	00	00	00	00	00
120393	00	00	00	00	00	00	00	00
120394	00	00	00	00	00	00	00	00
120395	00	00	00	00	00	00	00	00
120396	00	00	00	00	00	00	00	00
120397	00	00	00	00	00	00	00	00
120398	00	00	00	00	00	00	00	00
120399	00	00	00	00	00	00	00	00
120400	00	00	00	00	00	00	00	00

LISTINGS

<pre> 87 880 0019 80,188,30,80,288,30 880,187,30,81,187,30,8,188, 50,0,187 880 0019 48,87,83,138,818,83 117,81,93,117,83,83,117,8,1 87,48,1778 870 0019 0,80,118,0,13,117,0 95,105,888,818,95,818,87,13 818,1888 880 0019 80,0,818,138,108,80 0,30,878,188,80,878,0,13,87 7,0,188 880 0019 83,118,0,88,7,87,85 5,7,80,80,0,80,18,0,80,80,80 8 890 0019 108,78,0,88,888,188 33,888,188,88,888,0,13,881, 8,0,1888 890 0019 83,13,88,0,88,13,0 818,1,84,80,1,84,38,1,84,888 890 0019 88,188,88,8,83,888 187,23,888,8,0,13,138,88,8,8 7,1788 890 0019 7,87,818,7,88,88,8 88,78,0,80,88,888,88,8,80,80 8 890 0019 138,0,13,117,0,88,1 88,888,888,88,817,87,83,818, 18,0,1888 890 0019 838,88,188,88,0,33, 8,188,88,8,1,888,0,1,188 890 0019 188,188,0,188,0,88, 188,88,0,33,88,188,81,88,0,8 8,1888 890 0019 88,0,138,88,0,104,1 8,188,888,8,188,188,8,188,8, 78,1888 890 0019 888,88,0,88,88,0,88 178,0,78,88,0,88,88,88,88,88 8 890 0019 0,0,88,0,0,188,1,18 3,188,88,888,0,13,188,88,8,1 888 890 0019 88,88,0,8,188,0,18, 140,0,77,87,8,78,88,0,73,888 880 0019 85,0,88,0,88,188,3 3,78,188,88,0,88,188,0,88,80, 888 890 0019 0,78,88,0,888,88,87 188,188,8,88,188,188,81,0,3 3,1881 890 0019 80,188,33,80,188,33 78,0,188,188,0,78,188,188,3 3,88,188 </pre>	<pre> 890 0019 188,33,80,188,33,80 188,33,880,188,33,880,188,3 3,88,188,1887 890 0019 33,80,188,33,80,188 188,33,7888 890 0019 88,188,78,88,188,33 888,188,33,888,188,33,88,188 8,33,80,1778 890 0019 188,33,80,188,33,80 188,33,88,188,33,8,188,188, 8,188,1788 890 0019 53,23,88,0,23,88,0 3,188,0,3,188,88,0,88,88,871 8 890 0019 8,55,80,3,3,88,888 33,18,188,34,0,80,8,80,888 88,888,88,8,88,88,87,88,88 88,888,3,117,188,8,188,188, 8,1888 890 0019 8,88,8,188,80,0,88 88,117,818,88,117,818,33,117 818,1787 890 0019 88,117,818,188,81,8 3,88,188,88,0,88,88,117,88 3,88,1378 890 0019 117,818,88,117,818 88,117,888,88,188,88,3,13,188 188,87,1878 890 0019 88,188,7,188,888,88 117,818,83,818,818,88,0,8,1 3,188,1788 890 0019 80,8,88,7,888,88,7 188,88,888,188,8,881,188,8,8 88,1871 890 0019 888,8,888,818,8,0,8 8,0,8,88,188,88,8,33,7,888 888 0019 188,33,7,188,33,7,1 88,33,118,3,118,0,118,88,888 3,1888 890 0019 88,818,3,88,8,1,88, 8,88,188,80,3,33,7,888,33,88 8 890 0019 7,188,88,881,138,0 881,118,3,888,818,8,888,818, 8,0,1788 890 0019 8,8,8,7,88,188,78, 0,33,13,188,87,88,118,7,188, 888 890 0019 888,88,117,818,88, 118,818,88,8,8,0,188,33,888, 88,88,1878 890 0019 880,188,33,88,188, 33,88,188,33,188,188,88,188, 8,8,188,8818 890 0019 8,8,188,0,33,188,0 </pre>	<pre> -10,188,33,88,188,33,88,188, 33,888 890 0019 188,188,33,188,0,8 188,8,8,188,188,33,188,178, 188,33,8888 890 0019 888,178,33,888,188 33,88,188,33,33,188,33,13,1 88,33,188,1887 890 0019 188,33,10,188,33,10 0,188,33,10,188,33,10,188,33, 10,188,1887 890 0019 33,10,188,33,10,188 33,10,188,33,33,188,33,33, 188,33,1888 890 0019 888,8,138,888,188, 188,138,888,188,1,138,178,13 3,188,188,8,8887 890 0019 188,178,138,188,188,18 3,188,138,888,188,188,138,88,8 8,888,0,177,888,8817 890 0019 178,178,888,888,888,88 8,8,888,888,888,178,888,8,88 8,888,188,8888 890 0019 888,888,888,888,188 8,881,187,888,888,888,78,88, 8,888,8,178,8888 890 0019 33,888,888,0,138,1 88,188,888,188,178,188,188,1 88,178,188,888,8888 890 0019 338,178,188,88,138 1,887,188,888,138,188,188,188, 138,188,188,0,8888 890 0019 138,888,188,88,8,188, 3,888,178,8,38,188,888,888,0,88 888,38,8888 890 0019 888,888,888,881,80 1,888,888,7,881,88,88,880,81, 18,138,888,8887 890 0019 78,888,888,177,17, 17,78,78,88,88,88,88,88,88,8 8,78,1888 890 0019 87,88,88,78,88,77, 88,88,88,73,87,87,88,88,88,8,8 8,8888 890 0019 88,87,88,88,73,88, 78,88,38,88,38,78,88,38,87,8,8 8,8888 890 0019 88,38,0,88,78,88,8 8,888,88,38,88,88,88,78,88,88,88, 8888 890 0019 88,0,0,0,888,888,888 8,0,0,0,8,0,0,0,0,8,888 </pre>
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PROGRAM, SPRITE WORDS DISASSEMBLY

10 0000	*****	
20 0000	*****	
30 0000	*****	
40 0000	SPRIT0X	=80000 ;SPRITE 0 X-POSITION
50 0000	SPRIT0Y	=80001 ;SPRITE 0 Y-POSITION
60 0000	SPRIT0C	=80016 ;SPRITE ON/OFF SWITCH
70 0000	C0UNTER	=80004 ;INTERRUPT COUNTDOWN
80 0000	8ASTERL8	=80018 ;MASTER POSITION LD-BYTE
80 0000	8ASTERI	=8ASTERL8-1 ;MASTER POSITION RI-BYTE
100 0000	8NTELD	=80017 ;LD-BYTE INTERRUPT VECTOR
110 0000	INTEI	=8NTELD+1 ;RI-BYTE INTERRUPT VECTOR
120 0000	SPRIT8	=80078 ;SPRITE 8 SHAPE
130 0000	C0L8R	=80077 ;SCREEN COLOUR
140 0000	F8LSE8CE	=80021 ;SCREEN COLOUR LOCATION
150 0000	8T8P8	=880C0 ;SPRITE TEMPLATES
160 0000		.DRG 80000
170 0000	4E108E	18E 8E18P ;MOVE SPRITE TEMPLATE
180 0000	3E	8E78P ;INTERRUPT TIMER POSITIONS
190 0000	8E	8E8 ;

LISTINGS

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200 0000
210 0005 70      START
220 0008 #00E
230 000B 00F707
240 000E #01F
250 0010 000000
260 0013 000000
270 0016 000000
280 0019 000000
290 001C 000000
300 001F 000000
310 0022 000000
320 0025 000000
330 0028 000000
340 002B 000000
350 002E 000000
360 0031 000000
370 0034 000000
380 0037 00
390 003A
400 003D #00E REPEAT
410 0040 000000
420 0043 #00E
430 0046 000100
440 0049 #007
450 004C 000000
460 004F 000000
470 0052 000000
480 0055 000000
490 0058 #00E
500 005B 000000
510 005E 000000
520 0061 #000
530 0064 000000
540 0067 000000
550 006A #010
560 006D 000100
570 0070 #00F
580 0073 00F007
590 0076 #001
600 0079 000000
610 007C #000
620 007F 000000
630 0082 000000
640 0085 00F007
650 0088 #000
660 008B 000000
670 008E #001
680 0091 000000
690 0094 000000
700 0097 000000
710 009A 000000
720 009D 000000
730 00A0 #003
740 00A3 001000
750 00A6 0000
760 00A9 000000
770 00AC 000000
780 00AF 0000
790 00B2 000000
7A0 00B5 00F000
7B0 00B8 00F000
7C0 00BB 0000
7D0 00BE 0000
7E0 00C1 0000
7F0 00C4 0000
800 00C7
810 00CA
820 00CD
830 00D0 0A      SPLIT
840 00D3 0A      SPLIT

```

LISTINGS

```

850 C085 EA NOP
860 C086 EA NOP
870 C088 EA NOP
880 C08C EA NOP
890 C08D EA NOP
900 C08E A904 LDA #905 ;SERVICE SCREEN
910 C090 8D1100 STA FALSEBORDER ;SCREEN BK BLUE
920 C0A3 4D1100 LDA RASTERH1 ;SET RASTER INTERRUPT POSI
TION
930 C0A5 C508 ORA #508
940 C0A6 8D1100 STA RASTERH1
950 C0A8 4D0400 LDA #A600
960 C0A6 8D1100 STA RASTERL0
970 C0B1 A5C3 SETL0 LDA #SPLIT0&255 ;SET VECTORS TO
980 C0B3 8D1403 STA INL0 ;NEXT SPLIT
990 C0B5 A900 SETH1 LDA #SPLIT0/255
1000 C0B9 8D1503 STA INH1
1010 C0B8 A901 LDA #001
1020 C0BD 8D1500 STA 80019
1030 C0C0 4C31E4 JPF 8C431
1040 C0C3 ;
1050 C0C3 ;MOVE CATERPILLAR RIGHT
1060 C0C3 ;
1070 C0C3 4D7707 SPLIT2 LDA COLOUR ;SET SCREEN COLOUR
1080 C0C6 8D1100 STA FALSEBORDER ;TO BORDER COLOUR
1090 C0C3 A5FA LDA COUNTER ;INTERRUPT SELECTION
1100 C0C8 C504 CMP #904
1110 C0C3 36A9 BPL LEAVIT ;NOT CORRECT INTERRUPT
1120 C0CF ;
1130 C0CF A900 LDA #900
1140 C0D1 85FA STA COUNTER ;RESET COUNTER
1150 C0D9 A5F907 LDX SPRITE0
1160 C0DE 08 ;AX
1170 C0D7 F084 CPE #804 ;CHANGE SPRITE
1180 C0D8 3013 BPL STORIT ;LINE TO ROUET
1190 C0D8 F088 CPE #808 ;END OF ANIMATION CYCLE?
1200 C0DD 3628 BPL ORAY
1210 C0DF A980 LDA #880 ;FIRST SPRITE IN CYCLE
1220 C0E1 A00000 LDA SPRITE0X
1230 C0E1 C3A0 CMP #8A0 ;REACHED FINAL SCREEN POSIT
ION?
1240 C0E5 F02E BCC SPLIT03 ;YES - SET UP NEXT SPLIT
1250 C0E8 F00000 ORAY INC SPRITE0X ;MOVE SPRITE
1260 C0E8 F10000 INC SPRITE0X
1270 C0E8 8C7807 SIDRIT STA SPRITE0 ;CHANGE SPRITE
1280 C0F1 85FA LEAVIT INC COUNTER ;EXIT INTERRUPT
1290 C0F3 A901 LDA #801
1300 C0F5 8D1500 STA 80019
1310 C0F6 4D1100 LDA RASTERH1
1320 C0F8 25F7 AND #877
1330 C0F9 8D1100 STA RASTERH1
1340 C100 A907 LDA #SPLIT0&255
1350 C102 8D1403 STA INL0
1360 C106 A900 LDA #SPLIT0/255
1370 C107 8D1503 STA INH1
1380 C109 A000C0 LDA #A000C
1390 C10B 8D1100 STA RASTERL0
1400 C110 00 PLA
1410 C111 00 TAX
1420 C112 00 PLA
1430 C113 00 TAX
1440 C114 00 PLA
1450 C115 40 RPL
1460 C116 ;
1470 C116 ;SET UP NEXT SPLIT
1480 C116 ;

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LISTINGS

```

1490 C116 A522 SPLINT3 LDA #SPLIT36255
1500 C118 B8B9C0 STA SETELO-1
1510 C119 A9C1 LDA #SPLIT3/250
1520 C110 B8B7C0 STA SETENI-1
1530 C120 509C BNE MARKOUT
1540 C122
;
1550 C122
; OPEN TRAPDOOR AND FALL
;
1560 C122
;
1570 C122 ADF707 SPLIT3 LDA COLOUR ;INITATE BORDER
1580 C126 B8B1B0 STA FALSEBORDER
1590 C128 A5FA LDA COUNTER ;INTERRUPT TIME?
1600 C129 C804 COUNTDOWN C/P #C04
1610 C12C D053 BNE NOTTIME
1620 C12E A500 LDA #N00
1630 C130 86FA STA COUNTER
1640 C132 AEF807 LDX SPRITE0
1650 C136 0A BNE ;SEND SPRITE 0
1660 C138 E04C C/P #N0C ;NONE READY?
1670 C139 10FF BPL BEND2
1680 C13A A24C LDX #N0C
1690 C13C A901 LDA #N01 ;INTERRUPT MORE OFTEN
1700 C13E 0028C1 STA COUNTDOWN+1
1710 C141 18 CLR
1720 C142 A001D0 LDA SPRITE0Y ;SPRITE FALL
1730 C146 6302 ADC #N0C
1740 C147 8001D0 STA SPRITE0Y
1750 C149 C8E0 C/P #E0
1760 C14C D00A BNE INTERRUPT
1770 C14E CEF807 DEC SPRITE0+1
1780 C151 A901 LDA #N01
1790 C153 801500 STA SPRITE0X
1800 C155 D025 BNE NOTTIME
1810 C158 C8F4 BINTERRUPT ;BOTTOM OF FALL?
1820 C15A 5025 BCC NOTTIME
1830 C15C A505 LDA #N05 ;TURN OFF TRAPDOOR
1840 C15E 801500 STA SPRITE0X ;TURN ON WATER SPLASH
1850 C161 A901 LDA #N04
1860 C163 8028C1 STA COUNTDOWN+3
1870 C165 1CB1C1 JMP SPLINT4 ;SET UP BIGGER SPLASH INTER
RPT
1880 C168 E04E BEND2 C/P #N0E
1890 C169 8211 BHI MARKOUT
1900 C16D D005 BNE BEND1
1910 C16F CEF907 INC SPRITE0+1 ;FULL OPEN DOOR
1920 C172 D00A BNE MARKOUT
1930 C174 A803 BEND1 LDA #N03 ;SWITCH TRAPDOOR ON
1940 C176 801500 STA SPRITE0X ;WALF OPEN DOOR
1950 C178 A902 LDA #N02
1960 C17B 8001D0 STA SPRITE0Y
1970 C17E 4C88C0 MARKOUT JMP STOPIT
1980 C181 4CF1C0 NOTTIME JMP LEAVIT
1990 C184
;
2000 C184 ;SET UP SPLIT VECTORS
2010 C184
;
2020 C184 A980 SPLINT4 LDA #SPLIT48255
2030 C186 B8B9C0 STA SETELO-1
2040 C188 A9C1 LDA #SPLIT4/250
2050 C18A B8B7C0 STA SETENI-1
2060 C18C 509C BNE MARKOUT
2070 C190
;
2080 C190 ;SPLASH SPREADS & CATERPILLAR MOVES HORIZONTAL
;
2090 C190
;

```

LISTINGS

```

2100 C190 ADF707 SPLIT4      LDA COLUR
2110 C193 80E100             STA FALSEBORDER
2120 C196 A3FA              LDA COUNTER                ;: INTERRUPT TIME?
2130 C199 C504              CMP #804
2140 C19A D314              BNE NOTNOW
2150 C19C A900              LDA #900
2160 C19E 86FA              STA COUNTER
2170 C1A0 ADF907             LDA SPRITE0+2
2180 C1A3 C340              CMP #340                    ;: SPLASH DONE?
2190 C1A6 F50C              BEQ SPLASHOFF
2200 C1A7 E01E0             INC SPRIT0Y                 ;: MOVE SPRITE 0 DOWN
2210 C1A9 E01E0             INC SPRIT0Y
2220 C1AB EEF907             INC SPRITE0+2
2230 C1B0 7CF1CD NOTNOW     JMP LEAVIT
2240 C1B3 AEF907 SPLASHOFF   LDX SPRITE0                 ;: MOVE SPRITE 0 TO HORIZON#4
L
2250 C1B6 10FF              CPX #80F
2260 C1B8 D00E              BNE NOTPLAT
2270 C1BA A040              LDX #840
2280 C1BC 930E              LDA #SPLITS*255           ;: SET UP NEXT SPLIT
2290 C1BE 80B2C0             STA SPLIT0+1
2300 C1C1 88C1              LDA #SPLITS/256
2310 C1C3 80B7C0             STA SPLIT0+1
2320 C1C6 D007              BNE DONT
2330 C1C9 A901              LDA #801                   ;: ONLY CENTERFILLAR SPRITE ON
2340 C1CB 8D15C0             STA SPRITE0
2350 C1CD A90F              LDA #80F
2360 C1CF 70E0C0 DONT      JMP STOREIT
2370 C1D2
2380 C1D2
2390 C1D2
2400 C1D2 ADF707 SPLIT5     LDA COLUR
2410 C1D5 80E100             STA FALSEBORDER
2420 C1D8 A3FA              LDA COUNTER                ;: INTERRUPT TIME?
2430 C1DA C504              CMP #804
2440 C1DC 86E3              BNE DONT
2450 C1DE A900              LDA #900
2460 C1E0 86FA              STA COUNTER
2470 C1E2 AEF907             LDX SPRITE0
2480 C1E5 18              INX                         ;: CHANGE SPRITE SHAPE
2490 C1E8 A000D0             LDA SPRITE0X               ;: OFF THE SCREEN?
2500 C1EB 8003              BNE MOREPENT
2510 C1ED 7C04C2             JMP REPEAT                 ;: RESET ALL VECTORS
2520 C1F0 8004              CPX #804                   ;: TIME TO MOVE SPRITE?
2530 C1F3 300C              BHI DOSPRITE
2540 C1F6 D04E              CPX #84E                   ;: FINAL ANIMATION FRAME?
2550 C1F9 300E              BHI ALRIGHT
2560 C1FB A240              LDX #840                   ;: RESET TO FIRST ANIMATION F
*****
2570 C1FE E000D0 ALRIGHT    DEC SPRITE0X               ;: MOVE SPRITE LEFT
2580 C1F8 E000D0             DEC SPRITE0X
2590 C1FB 7C00C0 DOSPRITE    JMP STOREIT
2600 C201 7CF1CD DONT      JMP LEAVIT
2610 C204
2620 C204
2630 C204
2640 C204 A930 REPEAT      LDA #REPEAT*255
2650 C208 8DB2C0             STA SPLIT0+1
2660 C20B A90C              LDA #REPEAT/256
2670 C20E 8DB7C0             STA SPLIT0+1
2680 C211 80F1              BNE DONT
2690 C213
2700 C213
2710 C213
;: MOVE SPRITE TEMPLATE INTO POSITION
;:

```

```

2720 C210 A200 SETUP          LDA #800
2730 C212 A000 LOOPA         LDV #500
2740 C214 B93ED2 LOOPB      LDA SPRITES,Y
2750 C217 3000C7            STA STORE,V
2760 C219 4004             CPX #500
2770 C21C F00C             BND CHECK
2780 C21E CB              INY
2790 C21F 50F3             BNE LOOPB
2800 C221 CB              INX
2810 C224 8E18C2            INC LOOPB+2
2820 C225 8E18C2            INC LOOPB+2
2830 C228 00E8             BNE LOOPA
2840 C22A C03F CHECK      CPY #83F
2850 C22C F003             BND DONE
2860 C22E CB              INY
2870 C231 00E3             BNE LOOPB
2880 C234 A00C DONE      LDA #00
2890 C237 8001            STA #001
2900 C239 A00C            LDA #00
2910 C23B 8000C0          STA #0000
2920 C23E A000C0          STA #0000
2930 C23E                SPRITES

```

Routine Programming



PROPERTY: SUBROUTINE LOADER

```

00 0 PRINT"CLR:BOARD:LOADMORE
SUBROUTINE PROGRAM OR CHANGED
LISTING"END:SUBROUTINE"
01 1 GETCHR:INPUT"PROGRAM:FILE:
NUMBER"GET"FILE:END:GET"FILE:
END
02 2 FORM:OPEN:POKE#800-A:R:
END:IF #A#<#000:AA#150:":TR
END:R
03 3 INPUT:SUBROUTINE:FILE:END:
END:OPEN:FILE:PRINT:FORM:R:
END:END:END
04 4 FORM:OPEN:POKE#800-A:R:
END:R

```

```

05 5 POKE#R:R:PRINT:POKE#R:R:
END:POKE#R:R:FOR:DATA:
06 6 POKE#R:R:POKE#R:R:POKE#R:R:
END:PRINT:END:LOAD:END:PRINT:
END:END:END
07 7 PRINT:PRINT:PRINT:PRINT:
END:PRINT:PRINT:PRINT:PRINT:
END:END:END
08 8 END
09 9 CLR:PRINT:CLR:":

```

Sprite Library

*In this month's delve
into the library,
Mike Benn
discovers bird flight*

This month we go in search of that rare and exotic bird, the sprite. There are six sequences which can be joined together to make up longer sequences; the bird is made up of a single sprite, so it's possible to have a flock of birds flying around the screen at one time.

Table (Bird Flight - Multicolour)

AB-A4/158-164 Bird perched facing right, takes off to fly
A4-B0/164-179 Bird in flight, facing right
B3-B5/179-184 Bird turning to face viewer
B6-CT/184-199 Bird flying, facing viewer

CS-D1/200-209 Bird landing, facing viewer

DD-DF/210-225 Bird approaching from distance and turning to the right

Getting it all in

Type in the basic loader as published, and remember - save it, don't run it, or it will self-destruct and, possibly, burst into flames. Before running the loader program, you'll need to reset the computer and type in directly the following:

```
POKE41,0:POKE44,64:POKE11024,0:NEW and press return.
```

This will track the computer into believing that the basic rom starts at \$4000 instead of \$0801. Load in the basic loader and run it; if error free, the program will automatically save itself as a block of data. If you reload that data in the future, remember to add a 1 after the device number. The data is saved in the following location: \$2000-\$37FF.

The sprites run from 160 to 223 in a compromise to avoid the area \$2000 traditionally set aside for red-lined character graphics, and to avoid the need of typing in line after line of data.

If only one or two sprites are required, then use this formula - (SpriteBlock No.-100)*40 + 190 = the data line number at which that sprite block's data starts. Remember to type in the following three lines of data and alter the variable BL to the number of data lines you have in your finished program, line one.

The small basic program BIRD FLT DISPLAY will variously animate the sprites in both non-expanded and expanded forms on the screen simultaneously. To hold on any sprite, enter the same number for Start and End.

Any Sprite Editor program will enable you to change and adapt the individual sprites to your own requirements.

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B A E A H

Readers Problems

Though the Commodore 64 is one of the world's most popular microcomputers, it can be very difficult to find specific information about your particular machine.

At the Four Commodore office we receive literally hundreds of letters from you, our readers, on a wide range of subjects ranging from the simple 'Can you give me the telephone number for ...', to the more complex 'I'm trying to write a program that uses a split screen. How do I do it?'

Unfortunately, the volume of mail received has become so great that it is impossible to answer every letter and still manage to publish a magazine each month.

For this reason we have felt it necessary to produce a number of guidelines for getting information from us.

- 1) We cannot guarantee to answer every letter sent to the magazine. Should it become apparent that a number of readers are suffering from the same problem, then we will reply to the letter via the Letters page.
- 2) A new helpline has been set up. This will be open for your queries on

Tuesday and Thursday afternoons between 2.00pm and 4.00pm. We will not be able to deal with your telephone queries at any other time. If our technical adviser is not available when you ring, then a message will be taken

3) If you are having problems with one of our listings, can you please let us know in writing. This will enable us to see if a number of people are having the same problem. When a common problem becomes apparent with a program, then a correction sheet will be issued. Enclose a self-addressed, stamped envelope and we will send you a copy of the correction sheet as soon as it is available.

We are sorry that it has become necessary to institute these rules. However, we are sure that you will agree with us that the more time that we can spend making Four Commodore the most informative magazine around, the better.

For program queries write to:
Program Corrections
Your Commodore
1 Golden Square
London
W1R 3AR
If you wish to telephone then call:
01-435 8636 Extn 212

Commodore Where Are You?

At the Four Commodore office we are repeatedly asked for the address and telephone number of Commodore U.K. Many people, after referring to their computer manuals, believe them to be based in Corby.

The Commodore plant at Corby was closed down some time ago. Reprinted here you will find the correct address for Commodore U.K.

We suggest that you write this correct address in the front of your

computers manual for future reference.

Commodore Business Machines (UK)
Commodore House,
The Switchback,
Gardner Road,
Middlesbrough,
North Yorkshire TS6 7XA.

SPRITE CONTROLLER

The listing for the sprite controller has somehow got slightly mixed up. Line 21728 should read: DATA 64,

104,64,114,64,114,64,118. The line 22216 should read DATA 32, 32,32,32,32,32,32,32. The rest of the listing is correct, although the lines are out of sequence. This should not present any problems though.

GTX COMPILER

The more eagle eyed amongst you will have noticed that the gremlins have been at it again. This time there were two listings missing from the GTX Compiler program. If you would like copies of these listings, then send a large SAE to us at Bug finders and we will send them by return.

Bug Finder

We'd like to remind our readers that we run a Bug Finder service.

If you have typed in one of our programs and despite much checking, you still can't get it to run, then send us the following:

Two copies of your program on tape or disk.

A description of your problem. If possible a listing of your work (you may want this).

A stamped, self-addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.

Note: we can only deal with problems relating to programs published in Four Commodore.

The Nibbles By Alan Batchelor

Emlyn Hughes



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